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BRITISH EAST AFRICA.*

I. RECENT EXPLORATION AND SURVEY IN THE NORTH OF BRITISH EAST AFRICA.

By G. F. ARCHER, C.M.G., F.R.G.S.

In the month of May, 1909, the Government decided to occupy effectively the Northern frontier districts of British East Africa, that is, the country lying immediately to the south of the Abyssinian frontier, which had first been surveyed by Captain Maud in 1902–3, and by Major Gwynn in 1908–9. Some years previously, however, Mr. P. Zaphiro, a Greek gentleman, had been appointed by the British Minister in Abyssinia to watch our political interests on the border itself, pending the final settlement of the frontier question. The reasons for the occupation of this area were twofold. Firstly, raids into British territory by lawless bands of Abyssinians had been of frequent occurrence, and the tribes living within our sphere had claimed our protection. Secondly, it was hoped that there was some commercial benefit to the Protectorate to be derived by the opening up of trade routes with the southern provinces of Abyssinia, which were reported to be rich in hides, gums, indigenous rubber, coffee, and live stock. It was decided in the first place to establish a Government post at Marsabit, which is some 135 miles to the north of the Uaso Nyiro, and 175 miles beyond Meru, which was then the most northerly administrative outpost of the Protectorate. The writer was appointed District Commissioner and was accompanied on the initial trip to Marsabit by Captain Lely and Lieut. Cresswell with a detachment of troops, and by Mr. Cody, an assistant surgeon, and by Mr. John Fernandez, district clerk, while the caravan was composed of nearly six hundred men and was perhaps

* Map, p. 516.

one of the largest that had ever set out in recent years. Since the whole of this northern stretch was known to be waterless desert country, which in itself produced nothing in the way of grain supplies, much careful preparation was needed before such a considerable body of men could be launched into a remote and foodless region of this sort, and be there maintained. The caravan set out from Naivasha in the month of May, 1909, and having crossed Laikipia reached the Uaso Nyiro and followed it downstream for several days, till a point some 3 miles below Neumann's camp (a well-known landmark in this part of the country) was reached, and here a small police post was erected on a suitable eminence overlooking the river and on its north bank. The altitude of this post is some 2900 feet, and from the eminence a fine view is obtained over the surrounding country. Isolated hills and mountains, often grotesque in shape, rise in confused order from the plain and attain to altitudes of 6000 and even 8000 feet. The Nyambeni range, providing the watershed on the south-east, between the Tana river and the Uaso Nyiro, extends as far as the eye can see. On the north-west lies Mathew's range, which forms in conjunction with Ndoto, Nyiro and El Doinyo Mara an almost continuous mountain chain extending from Kenia to Lake Rudolf, and so on by Kulal, Esie, and Hurri to the confines of southern Abyssinia.

Striking away from the river at the post, a more direct route than that taken by previous travellers was discovered, along which were a succession of water-holes which makes the first 78 miles of the journey, as far as Lasamis, comparatively easy. The first stage is to Kauro, where there are two or three water-holes in the bed of a dry "khor," and this march of 34 miles is waterless except directly after the rains, when water collects in a few pans by the side of the road. For the first 12 miles or so after leaving the river the country rises slightly, but after that falls away in a north-easterly direction, and a gradual downward gradient is maintained throughout the journey until the actual ascent of Mount Marsabit begins. After leaving Kauro, water is found again at Kinya, 8 miles further on in the bed of the same watercourse, which, further north, joins the Merille khor, and together they swing round due east, forming the drainage channel for the streams of Kwe, Serelbarua, Lasamis, and one or two others, coming from the south-east of Marsabit. Finally it bends back south-east and completes its semicircular course by a junction with the Uaso Nyiro somewhere below the Chanler's falls. Water, it is believed, is to be found at certain points throughout its course.

The caravan track proceeded due north, and surface water is to be found at Langaia, 10 miles further on, issuing from a spring in the rocks at the north-east corner of a line of granite hills. From Langaia to the next water at Merille is a distance of 13 miles. The Merille khor runs almost due east and west, and is a broad one bounded on both banks by lines of dom palms, and water can be obtained almost anywhere by digging 2 or 3 feet below the surface of the sand. At certain seasons of the year, the

Rendile water their cattle and camels at this spot. When there is excessive drought in the surrounding country, elephants visit Merille to drink at night, when they feed on the nut of the dom palm, and there is also a great variety of game to be found in this locality during the dry season.

Fourteen miles beyond Merille is Lasamis (altitude 1800 feet), a desolate spot with a small khor running likewise from west to east, and in the dry season it is also remarkable for the quantity of game which assembles around its stagnant pools. At evening time, great flights of sand-grouse begin to circle overhead, and during the succeeding hours thousands of these birds come in from the surrounding country to drink. Another bird which frequents the water-holes in big flocks, is the desert pigeon (*G. Guinea*). Lasamis presents a lonely and arid scene, and it has been proved by experience to be exceedingly unhealthy. There are innumerable mosquitoes, and the carcases of dead animals, killed by lions round the pool, add an unwholesome aspect to the place.

At Lasamis ends the valuable chain of water-holes, and before proceeding it is well to make mention of the alternative track *viâ* Kwe, Turunong, Kabai, and Sirah, which strikes the Uaso Nyiro some 24 miles below the police post. Further east of this line there are two other permanent water-holes, which I have visited, at Serelbarua and Njoroi, and beyond these again water is reported at Ngare Nairoua, which is evidently a place with a hot spring. But from this point onward to Wajheir, so far as I am aware, no water of a permanent nature is to be found north of the Uaso Nyiro, and the region is thus uninhabitable except during the few weeks succeeding the rains.

A noticeable feature of the country lying directly east of the route I followed, is the succession of low plateaux, or tablelands, which are bounded by abrupt lava scarps. For the most part the higher ground, some 200 or 300 feet above the surrounding level, is very broken, and is composed of black cotton soil freely strewn with lava, and covered with low wait-a-bit thorn. In the intervening spaces the surface is of hard sand, covered with open thorn bush and freely intersected by dry channels, the courses of which are indicated by lines of flat-topped acacia trees and sometimes by clumps of "suaki" bush. Forty miles east of Merille these escarpments terminate, and the country beyond is unrelieved by hill feature, or landmark of any sort, and gradually falls away a featureless scrub-covered wilderness to Jubaland and the Indian ocean.

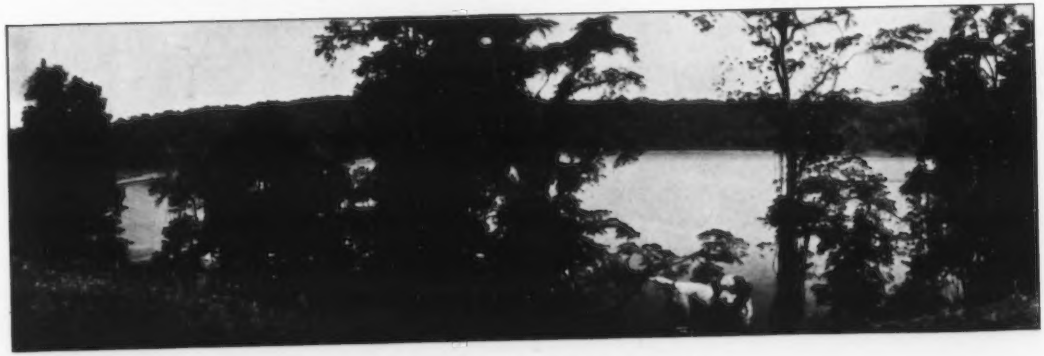
On resuming the northward march after leaving Lasamis, the caravan track runs across a low scarp; in the distance lies Marsabit, close on 50 miles away, known to the Rendile as Haldaiyan and to the Boran as Saku. From its base on the south-west to its base on the north-east, it may extend in a straight line for 30 miles; its slope is gradual and evenly maintained.

Starting at the plain level of 1600 feet, it rises to an extreme altitude of 5000, and its summit is covered with forest. On the south-western

slopes a chain of conical hills, extinct volcanoes for the most part, runs the whole way up the mountain, while on the southern slopes, there are a few solitary cones rising above the forest level, but all are dominated by the three main peaks of Marsabit. Seven or eight miles from Lasamis, west of the caravan track, stands Lodermurt, towering above the plain like an immense obelisk, 2000 feet high, and forming an unmistakable landmark, while to the south stands the solid granite mass of Moille, surmounted by a sharp and rugged peak.

The caravan track now leads on to the sand plains, and the long desert march of 56 miles to Marsabit begins. Fourteen miles beyond Lasamis, and marked only by a clump of suaki bush, there is a spring from which a small supply of water can sometimes be obtained. At this point branch off the two routes leading to the crater lake of Marsabit. One follows the chain of conical hills on the south-western slopes of the mountain, while the other goes *viâ* Ret and the south-eastern slopes. The latter is the better route and is generally adopted. In fact a caravan road was constructed later in 1912, and a Government service of bullock waggons traverses the whole stage from the Uaso Nyiro to Marsabit. On this occasion, however, the western route alone was known, and there was no track of any sort. The first part of the journey was safely accomplished, but owing to a mistake of the guide in steering a course too far to the east, very broken ground was entered on reaching the foothills of Marsabit, and this resulted shortly afterwards in a general collapse among the porters, owing to the trying nature of the country and the thickness of the wait-a-bit thorn. With a very limited reserve supply of water in hand, it was imperative that the crater lakes should be reached at the earliest opportunity. The march was continued throughout the early part of the night, under great difficulties, and camp was made halfway up the mountain. The next morning a start was made as the first streaks of dawn appeared, and the porters, refreshed by the cool moist atmosphere, rapidly ascended the mountain, and water was found by chance in a ravine just outside the forest. A delightful march of two hours on the following morning under magnificent trees, and through open glassy glades, brought us to our destination. The crater lake of Marsabit forms an almost perfect circle, a mile and a half in circumference, lying in the heart of a dense forest. The crater wall attains to a height of about 300 feet above the water-level. From here, however, it falls away rapidly along either side till at the south end the crest of the rise is little more than 30 feet above the lake-level, and this is the only practical approach. From any other point, access to water is difficult owing to the steepness of the sides. The forest extends down the slopes of the crater wall to within 10 yards of the water. The altitude of the lake is 4700 feet, and the forest belt begins at an elevation of about 4300 feet. Except in the very dry season, the forest area of Marsabit is generally wrapped in mist until 11 o'clock in the morning. The virgin soil is exceedingly fertile, though grain crops have to be carefully attended to on

THE SOUTH-EASTERN CORNER OF MOUNT EUDOTO, IN THE HIGHER COUNTRY ON THE WEST.



VIEW OF THE CRATER LAKE AT MARSABIT.

THE DRY WATERCOURSE AT KENYA.

THE RIVER JUBA AT BARDERA, FROM THE WEST BANK.

account of porcupines, and the destructive tendencies of numbers of baboons, which are to be found in the vicinity of the lake. The nights are often unpleasantly cold, and during the rains the place is naturally very damp. Four or five miles further on through the forest is another crater lake, which is somewhat smaller in size and covered with papyrus, so that it presents the appearance rather of a swamp, but no track of elephant or buffalo leads across it, from which it may be assumed that there is a considerable depth of water below the reedy surface. On the southern, western, and northern slopes, outside the forest area, are several dry craters, varying in size and depth, of which the most striking is the one near the caravan track on the northern slopes of the mountain. This forms a splendid amphitheatre, 500 or 600 feet below the ground-level and nearly a mile across. The whole region shows signs of recent volcanic action, and the mountain is encircled by a broad belt of lava extending for 10, and in places as much as 30 miles beyond its base.

The country lying between Marsabit and Rudolf is difficult to traverse, on account of the exceeding scarcity of water. The name of Elgess is applied by the Rendile to the whole country lying to the west and south-west of Marsabit. The first stage of the journey is across the lava-strewn area west of Marsabit, to the water-hole of Laipera. From here onwards no water of a permanent nature is to be found until the southern shoulder of Mount Kulal has been turned and the lake is reached in the vicinity of Loiyangelani. Previous travellers have alluded to the appalling lava region bordering the lake at its south-eastern corner, and little need be said about it here, but the country to the east of Kulal is level but for a few low limestone ridges, whose mean elevation is about 1700 feet. The soil is red sand and covered with low thorn-scrub. An interesting feature, however, is the great Balissa watercourse, which, starting at Orr between El Doinyo Mara and Nyiro, skirts round the eastern slope of Kulal and Esie, and apparently holds on its course till near Lake Stefanie, thus forming the drainage channel of this entire region. At Loiyangelani there is a small Government post consisting of a British officer and a detachment of fifty native troops.

It may be of interest to record the presence in the waters of Lake Rudolf of the baggora, or giant Nile perch. One of 31 lbs. weight was landed by the writer in March, 1912, and there are undoubtedly a great number of these fish in the lake.

The chief interest of Mount Kulal which dominates the south-east corner of Rudolf, is the wonderful rift cleaving the mountain in twain. The chasm is less than 100 feet across at the crest, but falls sheer for probably 3000 feet, thus dividing the mountain into equal parts without inter-communication. In my own case, having ascended the northern side of the mountain for purposes of survey, I was obliged to retrace my steps the whole way to the bottom, before being able to reach the southern block. The mountain attains an elevation of 7500 feet, and the summit

is forest-clad. The water-supply, however, is exceedingly limited, being confined to half a dozen pools.

Space forbids any further detailed account in this paper of the vast tracks of the northern frontier district, but it may be said that as one proceeds south from Kulal, the country gradually rises till the high ground about Lorogi is reached, and this again emerges into Laikipia, and the well-known uplands of British East Africa. Though Lorogi offers fine pasturage, it is deficient in water, and this applies equally to all the highlands situated in this northern area.

North-east of Kulal and beyond Esie, which, properly speaking, is a hog-backed scarp rather than a mountain, lies the Hurri range. Though attaining to an altitude of slightly over 5000 feet, it is in no part forest-clad, and consists of open rolling grass plains, surmounted by a row of conical peaks. It offers good grazing-ground for stock, but having no permanent water, it is only habitable during and directly after the rains.

East from here and stretching to the horizon lies a featureless arid track, waterless, lava-strewn, scarcely even bush-clad, and the monotony and the desolation of the scene are only relieved by the sight of the magnificent mountain mass of Marsabit in the south-east and the great chain of mountains in the north, known as the Boran escarpment.

It was realized that this district offered an interesting field for a geographical survey, for, beyond the survey of the frontier itself and of the Rudolf coast region, together with one or two rapid route-traverses made by travellers in the intervening area, there was little data available on which to fill in the blank spaces of the map.

Independent work was begun by the writer in August, 1909, when a base was measured on the Uaso Nyiro; and thereafter a triangulation was carried north to Marsabit. From this point it was extended north-west to Rudolf. The Uaso Nyiro base was subsequently connected with the main Protectorate triangulation by Lieut. Coode, R.E., and the necessary correction was then made to adjust the Northern Frontier District triangulation to the main Protectorate triangulation. A junction with Captain Maud's and Major Gwynn's frontier work was effected at three points east of Rudolf-Kulal, Esie (or Asi), and Hurri (South peak).

The work thus executed provides the connecting link between the Protectorate survey and the Abyssinian frontier surveys with their widely separated origins as regards longitude, viz. Cape Town in the south (Archer, based on the Protectorate value); Tibonti (Gwynn) and Khartum (Maud) in the north. It may be of interest to record here the respective values obtained for the connecting points, which are as follows:—

Kulal.

	Latitude.			Longitude.		
	°	′	″	°	′	″
Archer	2	43	53·1	36	55	37·6
Maud	2	43	40	36	54	56·1
Gwynn (correction)		—		36	56	34·1

Esie or Asi.

	Latitude.			Longitude.		
	°	′	″	°	′	″
Archer	2	57	53·7	37	6	5·1
Maud	2	57	45	37	5	27·7
Gwynn (correction)		—		37	7	5·7
Hurri (Southern cone).						
Archer	3	19	12	37	38	34·1
Maud	3	19	0·6	37	37	53
Gwynn (correction)		—		37	39	31

From which figures it will be seen that as regards longitude practically a mean between Captain Maud's original and Major Gwynn's revised values has been obtained from the survey under review, while differences remain fairly constant, thus—

Maud in respect to Archer.	Latitude.		Longitude.	
	′	″	′	″
Kulal (Maud's lat. and az. stn.)	−0	13·1	−0	41·5
Esie (Maud's lat. intersected point)	−0	8·7	−0	37·4
Hurri (Maud's lat. intersected point) ...	−0	11·4	−0	41·1
Gwynn with his correction +1′ 38″ standing in excess.				
Kulal			+0	56·5
Esie			+1	0·6
Hurri			+0	56·9

It appears, on analysis, that Major Gwynn may have over-corrected Captain Maud's longitude with his alteration of + 1′ 0·38″.

As regards topography, most of the country on the west side of the district is now mapped. The writer has made plane-table sketches, based on the trigonometrical points, from the Uaso Nyiro base to Marsabit; from Marsabit to Moyali on the Abyssinian frontier; and from Marsabit to Rudolf and thence south into the Sambur country. The survey of the eastern shore of Lake Rudolf was included in Captain Maud's frontier survey, and there now only remains for completion, beyond the filling in of minuter detail, the Mathews range and the country lying south of Mount Nyiro and west of Mount Ndoto. In this area, moreover, traverses, checked by astronomical observations, have within the last few years been made by Captain Stigand and by Mr. A. C. Hoey, who accompanied Mr. N. C. Cockburn on his journey to Abyssinia. Our knowledge here is thus fairly complete.

On the eastern side a compass traverse, checked by astronomical observations, was made by the writer of the route through the Marehan country from Serenli to Dolo at the extreme north-east corner of the Protectorate; and another traverse made of the caravan route from Eil Wak (position determined by Major Gwynn) to Serenli. Little topographical detail, however, of the country to the south of this line and to the north of the Uaso Nyiro is, as yet, forthcoming.

Further information of a more technical nature regarding the survey will be found by those interested in the subject in the Appendix to this paper.

To Dr. Donaldson Smith is due the credit of having been the first scientific explorer to penetrate inland from the east coast of Rudolf and locate Marsabit; and the position he assigned to the Crater lake in the year 1895 serves as a good example of the high degree of accuracy he maintained in the survey of his route.

The figures are as follows:—

	Latitude.			Longitude.			Height,
	°	′	″	°	′	″	ft.
True position *	2	16	30 N.	37	57	5 E.	4700
According to maps in general use	2	7	30 N.	38	10	0 E.	—
Donaldson Smith's value † ...	2	15	0 N.	37	55	0 E.	4720

Considering that Dr. Donaldson Smith carried his traverse many hundreds of miles from the north-east coast of Africa through Somali and Abyssinian territory, this accuracy in longitude is, I think, very remarkable indeed.

The two chief difficulties to be contended with in executing a survey in the Northern Frontier District are the waterless nature of the country and the constant haze. The first difficulty is overcome by the employment of camel transport and the carriage of water-tanks, while the second difficulty confines really satisfactory survey operations to the rainy season, viz. November, December; April and May; and the best results are then only obtainable in the late afternoon between the hours of three and six. In the morning, as a rule, the haze starts with the rise of the sun. In this connection an interesting meteorological question arises as to whether what is here described as "haze" is really an opacity of the atmosphere or the "heat-quiver" so familiar to surveyors in hot countries.

The work indicated has been extended over a period of nearly three years, from August, 1909, to April, 1912. It must, therefore, be explained that administrative duty claimed the writer's first attention, and the progress of survey was dependent on many other considerations. Furthermore, accuracy of detail, rather than the rapid sketching of a vast area, was the ideal always held in view.

I take this opportunity of recording my appreciation of the services rendered to me in executing this survey by Mr. John Fernandez, who went outside the routine of his ordinary duties to assist. He built most of the beacons for me, and often helped in computing; and in addition he made several useful route-traverses himself.

APPENDIX.

NOTES ON THE SURVEY OF THE NORTHERN FRONTIER DISTRICT, BRITISH EAST AFRICA. BY CAPTAIN G. C. WILLIAMS, R.E., DIRECTOR OF GOVERNMENT SURVEYS.

Mr. Archer's triangulation of the Northern Frontier District of British East Africa is based on two major points (Koitorgor and J.) of the main triangulation of the Protectorate.

* Found by plane-table fixing from trigonometrical points, 1910.

† Roughly ascertained from the maps published with his book.

The work joined up with Major Gwynn's Abyssinian Boundary Survey and with Captain Maud's work in this district, and the whole may be summarized as follows:—

(1) *East Africa Protectorate Survey.*—Longitude obtained from Cape Town by cable to Zanzibar; thence by triangulation over distance of 300 miles, having twenty-eight triangles and probable triangular error of 3″ or 4″ to the Anglo-German border near Elemombarasha hill; thence by a triangulation over distance of 200 miles, having twenty triangles and probable triangular error of 1·5″ to two points (Koitorgor and J.) on the Northern Uaso Nyiro, about 11 miles apart. Here the main triangulation in 1911 stopped, and Mr. Archer from this side carried a tertiary triangulation up to the Abyssinian border. The latitude of the East Africa Protectorate Survey was obtained from a carefully observed astronomical latitude on the Athi plains and carried by a triangulation over a distance of 170 miles, having eighteen triangles and a probable triangular error of 1·5″ to the above-mentioned side on the northern Uaso Nyiro.

(2) *Archer's Survey.*—From this base to the junction with Major Gwynn's points on the Abyssinian border, Archer's triangulation shows an average triangular error of 22″ over a distance of 200 miles, with thirteen triangles. Unfortunately only nine out of thirty-five triangles were fully observed, so that this average triangular error, though the only obtainable guide to the accuracy of the work, is none too conclusive.

(3) *Major Gwynn's and Captain Maud's Surveys.*—Major Gwynn first took a chart value for longitude at Jibouti, carried chronometers to Dire Daua from Jibouti and back, so fixing the longitude of Dire Daua; thence he made a rapid triangulation to Addis Abbaba. There joining on to Captain Maud's points, he found a difference in longitude of 1′ 38″ (+) from the value used by Captain Maud, and corrected Captain Maud's work throughout by this amount. For details of Major Gwynn's survey, see "A Journey in Southern Abyssinia," by Major C. W. Gwynn, C.M.G., D.S.O., R.E. (*Geographical Journal*, 1911).

The original longitude of the whole of Captain Maud's survey depends on that found by Major Gwynn in 1901 by rapid triangulation to two points on the Sudan frontier which were dependent in turn on a triangulation system whose origin was the telegraphically fixed position of Khartum. Major Gwynn, however, states in the above-mentioned *Geographical Journal* paper that his triangulation in 1901 was a very rough one, with a small instrument, and only gave a weak connection with the Sudan values. It was the best that Captain Maud could obtain at the time, however.

The comparison of Major Gwynn's, Captain Maud's, and Mr. Archer's work shown by the co-ordinates of three points common to their work (viz. Kulal, Esie and Hurri) is given by Archer in the accompanying paper.

From the above considerations it would appear that Archer's work is the most reliable, and from examination of the co-ordinates of the three common points a general correction of −58″ in longitude throughout Major Gwynn's Abyssinian Boundary survey would seem to give the most correct result.

As has been shown in the Director of Survey's analysis, time available for survey work did not enable the writer to confine himself to deliberate methods with beaconed points; and rapid triangulation, with, at first, a 3-inch and subsequently a 5-inch micrometer theodolite, had to be resorted to frequently. Alternative values obtained, however, in cases where only two of the three angles of a triangle were observed, gave invariably close results, and the means, therefore,

are certainly sufficiently reliable for the purposes of a small-scale geographical survey.

It may be of interest to record that in 1912 the mean magnetic variation on the west side of this northern frontier district was $5\frac{1}{2}°$, while in the Marehan country near the Juba, from the few observations taken, it was found to be $3\frac{1}{4}°$.

II. A JOURNEY FROM THE RIVER JUBA BY DOLO, MOYALE, AND MOUNT MARSABIT TO THE UASO NYIRO.

By Captain C. N. FRENCH.

This journey, a distance of about 740 miles, was undertaken by Colonel Thesiger, Inspector-General King's African Rifles, accompanied by Mr. G. F. Archer, at the time Officer-in-Charge of the Northern Frontier District of British East Africa; Lieut.-Col. Breading, D.S.O., Commandant of the 3rd Battalion King's African Rifles; Captain French, Staff Officer, and Lieut. Loder-Symonds, Adjutant of the 3rd King's African Rifles, with a view to examining the strategical and administrative possibilities and requirements of that part of the Anglo-Abyssinian border that lies between Dolo and Moyale. It will be evident, therefore, that any exploring and surveying were done as it were in leisure moments. The map illustrating this paper, with the exception of such areas as were surveyed by Major Gwynn and Captain Maud, was compiled entirely by Mr. Archer; but as far as this particular journey was concerned, he was unable to devote as much time to them as he would have wished.

The party assembled at Serenli,* a military post on the Juba, early in November, 1911, Mr. Archer having come from Marsabit *viâ* Moyale and Eil Wak, while the rest of us came up the Juba by steamer from Gobwen.

On November 6 we started. Our transport consisted of about 100 camels, some of which were hired from the Aulihan section of the Ogaden Somalis who live in the vicinity of Serenli, and some from the Garre, a half Somali half Boran tribe whose centres are Eil Wak, Muddo Erri, and Eil Banissa.

We had decided to go from Serenli to Dolo by the direct route, and not to follow the river Juba *viâ* Lugh, and in this way we were enabled to traverse the Marehan country about which very little was known. This tribe is a section of Somalis—several sections of the Marehan have lived in this part of the country for a considerable time, but their numbers have recently been increased by the immigration of the Galti section of the Marehan from Central or West Central Somaliland.

The distance from Serenli to Dolo by Dabloi and Abu Madert is about 150 miles, but we did not reach Dolo until November 21, having been delayed by numerous interviews with Marehan chiefs and elders on the way.

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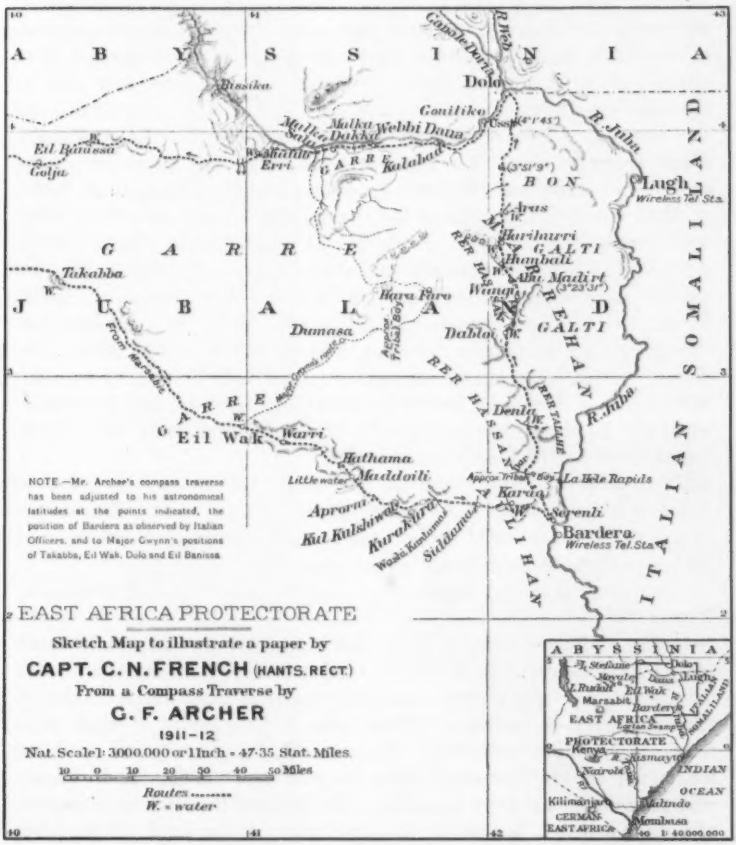
* Serenli = Serenleh, *i.e.* the place of the "sarren" grass.

The Marehan country is covered with thick thorn-bush, which, however, is far less dense than that traversed on the Eil Wak, Serenli, and the Afmadu-Serenli roads. The thickness of the bush on the former of these roads will be realized from the fact that Mr. Archer was generally unable to obtain a forward compass-bearing except by the sound of the camel-



bells in front of him. The country of the Marehan is, moreover, very much better watered at this time of the year. This, no doubt, was partly owing to the recent rains, but it is also accounted for by reason of the natural features of the country. We crossed numerous watercourses, in most of which the water was actually running, and of which the most important are the Dar (the boundary between the Aulihan and Marehan), the Denla,

the Dabloi, and the streams at Abu Madert, near Humbali hill, and the Aras. This north-eastern corner is very much more undulating than most parts of Jubaland, and our route took us over numerous spurs of a plateau lying to the west of us. These spurs project into the valley of the Juba, into which the watercourses also run.

The actual valley of the Juba is extraordinarily level; for instance, although Serenli is 450 miles from the sea by river, it has an altitude of only about 500 feet, and we found that some 11 miles north of that place we had risen to 900 feet above sea-level—that is, we were already at an altitude equal to that of Dolo. It should be mentioned here that all altitudes were taken with an aneroid only, but as they tallied with and were corrected by those given by Major Gwynn, they may be regarded as a fair approximation. The greatest height that was noted during this part of the journey was 1450 feet at a camp about 17 miles south of Dabloi.

Dolo marks the junction of the rivers Daua, Ganale, and Web, which unite here to form the Juba. From Dolo the Juba flows in a south-easterly direction to Lugh, where there is an Italian station, and thence south again past the so-called rapids to Serenli and Dolo, and from there to the Indian ocean at Gobwen—a distance of just over 300 miles, in a straight line, though the actual distance by river must be well over 600 miles. The river is navigable by shallow-draught steamers from its mouth to a few miles north of Serenli for four or five months of the year, and is probably navigable by similar steamers and for the same period from Dolo downwards to the northern limit of the rapids.

We found all these rivers at half flood, the Daua being some 40 yards wide and about 4 feet deep at its deepest point. The natives of this part of the world do not appear to be afraid of crocodiles, and wade across the Daua with the utmost unconcern.

The Ganale is a much bigger river—some 80 yards wide and unfordable. Two of our party crossed over to the Italian side on a native boat, a pole-propelled craft consisting of some eight logs tied together, which sank almost level with the water with its burden of three not very heavy men. The Italian post consists of a small but neatly laid out station under an Abyssinian non-commissioned officer with a detachment of eight most nondescript soldiers under him. These were drawn up as a guard of honour for us, and we duly inspected them, the rear rank shaking hands warmly with us as we passed down their line. The banks of the Daua seem capable of being cultivated, but not to the same extent as the banks of the lower Juba, nor does the tribe living near Dolo—the Gabawen—appear to be as industrious or skilful cultivators as the Gosha.

From Dolo to Moyale we followed the same route as Major Gwynn's party.

From Banissa we went by Gaddaduma to Moyale. As far as Golja, where there were some pools at the foot of two rocky knolls, we followed Major Gwynn's route, and thence turned southwards to Gadeir. The

THE DIDA GULLGULLO BETWEEN MOYALI AND MARSABIT. THE "PLACE WHERE MEN DIE."

THE RIVER JUBA AT SERENLI.

HUMBALI MOUNTAIN AND HUMBALI STREAM.

water we found at Gadeir was also in a pool near a rocky hill, but there are some good wells some miles to the west of where we camped.

From Gadeir our route lay south-west to Gara Gaggaba, and thence to the good wells of Gaddaduma. These are at the very foot of the escarpment, and are said to be unquestionably perennial, and the water, to those who have drunk at the polluted pools at Golja and Gadeir, is indeed excellent. Here we found ourselves in Boran country, and during our stay at Gaddaduma we saw thousands of their stock—cattle, sheep, and goats—brought down to water at the clay troughs which the Borana make at the edges of the wells. The Borana are probably more like the Galla, said to be the aboriginal inhabitants of this country, than any other tribe. They are an inoffensive and not particularly interesting people, cattle- rather than camel-owners. They carry a very heavy spear, the size of the blade being in inverse proportion to the warlike instincts of the spearmen.

The route along the frontier is now comparatively well known, and it is not necessary to do more than touch on some of its most salient features. The most noticeable, of course, is the escarpment which separates the arid bush-covered country from the high-lying and fertile grass land of southern Abyssinia. This rises steeply from the desert, its general direction being east and west, but the line is broken by the fine peak of Gara Roka, which juts out into the plain some miles west of Gaddaduma. From the same point the isolated hills, Gaiya, Dirri, Kuffole, Dandu, and Gadeir form, as it were, a semicircular group of islands in the sea of bush, the general direction being south-east near Gaddaduma, and curving round gradually northwards until the line of hills almost connects with the escarpment at Gara Gamadda. South of Moyale another great southern spur, Gara Topeisa, projects into the plain, and to the west of this there are numerous isolated hills, of which the great rock at Turbi marks the last water before crossing the Dida Gulgullo, the lava-strewn plain between the Boran escarpment and the mountain mass of Marsabit.

Moyale, or, as it was originally called, Fort Harrington, was once the headquarters of Mr. Zaphiro, a Greek gentleman who for several years controlled the frontier for us by a happy combination of diplomacy and audacity. He built the station, which consists of an inner and outer boma, or brushwood stockade, with some excellent huts of Abyssinian pattern in the centre. It is now occupied by a detachment of the King's African Rifles, and is the headquarters of an Assistant District Commissioner. From Moyale the road to Marsabit runs first in a westerly direction under the escarpment, and past the splendid rocky bluff of Gara Abo to Burroli hill, at the foot of which is Ramut well. The people here are Gubbra, who are very similar to the Borana, except that they are camel- rather then cattle-owners. From Ramut we marched in a south-westerly direction past a lagga or watercourse, which was quite dry, but which in the previous August had held water in spite of the fact that it was then

the height of the dry season. We found water at Turbi, which is a rocky hill some 20 miles south of the line of the escarpment. There was only a moderate supply in the holes at the foot of the hill, and we drew most of our water from the rock pools on the hill itself. The largest of these lay some 200 feet above our camp; but in spite of this and the steepness of the rock, our eight good Wanyamwezi porters carried our water-tanks up and down single-handed, each man making about three trips. The tanks contained some 12 gallons apiece, and weighed about 180 lbs., a good half camel-load, and the feat of carrying one of them single-handed could almost certainly only be accomplished by one of these best of porters. From Turbi we could see the great mountain mass of Marsabit 70 miles to the south of us. To the north-west were Gara Dimtu and Gara Furroli, while to the west lay the Hurri hills, a fine but unfortunately waterless range, beyond which we were just able to see Kulal mountain, which is about 100 miles from Turbi. Between us and Marsabit lay the brown desolate Dida Gulgullo—known to the Somalis by the cheerful title of "The place where men die."

On first leaving Turbi, our route, which was very well defined, lay across an open grassy plain that in a very few miles gave way to thorn bush country with a few of the lava stones which were to become so unpleasantly familiar during the next 50 miles. As we moved south, the bushes became more and more scattered, and the lava correspondingly thicker, until we eventually marched across a desert entirely covered with lava. This, again, we saw at its best, for tufts of withered grass had forced their way up here and there, and on this a few oryx and Grant's gazelle seemed to thrive. Our march would have been a very hot and uncomfortable one had it not been for the strong easterly breeze which blows daily from sunrise to sunset. The nights, too, were cool, and one could sleep under a blanket with comfort.

Forty-six miles from Turbi we came to regular walls of lava, piles of black rock which averaged some 15 feet in height. As we neared them, the lava stones became larger and more scattered, and we noticed that at the edge of the lava were numberless almost perfect circles of stones. These some have believed to be the work of natives, but it is more probable that they mark the last bubbles in the lava as it cooled. On the southern side of these walls we found a level sandy grass plain, and were also lucky enough to come on water which the sun and the wind had not had time to evaporate since the rains.

From here to the station on Marsabit mountain the road is comparatively clear of lava, and there is no permanent water to be found between this point and "Delamere's water"; the country can hardly be described as a desert, as there is plenty of grass as well as bush.

The ascent of the mountain is extraordinarily easy. Nowhere are the gradients steep, which is hardly to be wondered at, as in 21 miles the difference in altitude is only just over 2000 feet. Marsabit is, in truth, a

mountainous mass rather than a mountain, measuring over 40 miles from north to south and probably nearly as much from east to west.

And thus we finally came to the Government station of Marsabit, which has been admirably laid out in a charming and beautiful situation in the forest overlooking the Crater lake.

A JOURNEY IN MAZANDERAN (FROM RESHT TO SARI).*

By H. L. RABINO, lately H.B.M. Vice-Consul in Resht.

MAZANDERAN has a great fascination for the student of Persian history. The province preserved the Pehlevi writing long after the introduction of Arabic characters into the rest of Persia, and its language has not yet entirely given way to modern Persian. It has a separate history of its own, and it was only towards the close of the sixteenth century that the descendants of its Sassanian rulers were finally dispossessed of their patrimony by Shah Abbas the Great.

Leaving Resht, the capital of Gilan, and following the road constructed a few years ago by the Sepehdar-i-Azam, we passed the bazaar of Ajibisheh and reached the Geishehdemerdeh canal, on the left bank of which is a newly constructed rest-house. From here "kerejis," the flat-bottomed sailing-boats of the Caspian shores, ply to Hassanrud on the lagoon of Enzeli.

The Nowrud, sometimes called Lalehrud, is a canal from the Sefid Rud, and on its right bank near the bridge is Lalehdasht. The bazaar of Kuchisfahan consists of two rows of shops with a gateway to the west, but open to the east. It was Sunday and market day, and the whole place was alive with ambulant sellers of cotton goods (some from Manchester), earthenware, provisions, tobacco, fruit, etc., the crowd being villagers from the neighbouring districts. These bazaars, called "gurab," where markets are periodically held, are usually empty on other days. They are only found in Gilan and western Mazanderan, and, as a rule, are at least 4 miles apart.

Reach Reshtabad on the left bank of the Sefid Rud, near by being a fishery station for sturgeon. The country between Resht and Reshtabad is open, and the jungle cleared for rice-fields and plantations of mulberry and tobacco irrigated from the Khomamrud, Nowrud, and other lesser canals of the Sefid Rud. The ground near the Sefid Rud was sandy and firm, with a considerable open space covered with grass. The river at this time of the year is barely 100 yards wide, and not very deep. The current was not rapid, but it becomes so in spring, when the river, which

* I have embodied in this narrative the observations made by me during two successive journeys through Mazanderan—one in the spring of 1908 and the other in the winter of 1909.

is constantly changing its course, does considerable damage to the neighbouring villages and fields. We cross in the "gami" or flat-bottomed ferry of native construction. Amid-stream could be seen a ruined arch, all that remains of the former bazaar of Kisum carried away by the river a few years ago. A new bazaar has been built half a mile further on.

The Givdarreh or Siahrud is crossed by a brick bridge. The strong stream of Shimrud, which has its rise in the mountains of Deileman and flows into the Sefid Rud near its mouth, is crossed by a pointed bridge of brick. Like all streams in Gilan, it is fordable now in many places, but becomes a rapid torrent in spring. Farther on we pass the shrine of Seyyed Hassan, a prince of the Amir Kiai dynasty of Lahijan—a fine building for Gilan, with an avenue of "azad" trees, and a place of pilgrimage much frequented by the inhabitants of Lahijan. Soon afterwards the corrugated iron roofs of cocoon-drying establishments come in view, and passing the Lahijan river by a brick bridge, we enter the town.

The Amin-ed-Divan built a villa here, and has started tea planting. Tea was first introduced in Gilan by Kashef-es-Sultaneh a few years ago, and I am told that there are now forty thousand plants in the district. Unfortunately, the Russian gardener, engaged to teach the natives how to grow and blend the tea, left on account of misunderstandings with his employer, and the "Gileks" or inhabitants of Gilan are now working without technical knowledge. Towards the foot of the hills were extensive orange groves up the hillsides, but they had suffered a few years ago from the severe cold, and were just beginning to recover. From the Shah Nishin spur at our feet lay the "estalkh" or lake, and the Sabz-Maidan or green square of Lahijan, with the cottages of the town among the trees. To the north lay the Caspian, and to the north-east the houses of Langerud. The rest of the country was one mass of green forest and jungle, with only a few streaks of smoke to reveal the existence of its numerous settlements.

Leaving Lahijan, we pass the Sabz-Maidan with its lake, and continue eastward. At 2 miles, we pass the picturesque shrine of Sheikhanbar, with its blue-tiled dome, among trees at the foot of the mountain of the same name. We continue through the jungle, and stop a few minutes at Divshal, to visit the garden of the Munajjem Bashi of Langerud, said to be one of the finest in Persia. On the crest of the mountain, above Divshal, is the Imamzadeh Atakuh.

The road follows the slope of the low hills as far as Lilehkuh, and is bordered with trees and boxwood. The road for nearly 7 miles from Lahijan has the same low wooded hills with stony spurs on their slopes on the right, and jungle, rice-fields and mulberry plantations, intermixed with occasional "tilimbars" or silk granaries and houses, sloping down to the left. Langerud stands in an open plain, the road being raised above the rice-fields.

The Shalman, also called Lalehrud, is about 30 yards wide, with a

gravelly bottom; in spring one has to cross in "kerejis." The houses are built here of beams, like a log cabin, the interstices being filled with mud, and the roof covered with flat wooden tiles readily kept in their places with stones. The "tilimbars" and rice granaries were of the same form, being thatched and one-storied.

The road is bordered by "tuseh" and many "shund" or "palam" (*Sambuccus ebulus*), trees which reach to a height of 5 or 6 feet. After passing the Shalman river by a brick bridge we enter the Sarpord quarter of Rudisar, where are the telegraph office and a mosque. The Rudisar has a lofty steep bridge, to the east of which are the ruined piers of a former bridge. The bazaar of Rudisar is built like a huge caravanserai with four entrances. The road is open and fairly good, bordered with boxwood and "leileki" trees, running north-east to the Caspian, about a mile from the Rudisar bazaar. We crossed the Kaldarreh stream over a wooden bridge with a thatched roof.

We then reach the Pulurud, a large river from the Somam Kuh; near the mouth of which is a fishery station. Passing a large brick building for storing rice on the beach made by Aga Seyyed Habib of Kolachah, cross the Gezafrud, about 1½ miles from Pulurud. There was a miserable plank bridge, but we preferred to ford. Nowdeh is a large village, and its products are rice and silk. For rice, the cultivator supplies the seed, oxen and labour, and receives two-thirds of the crops. For silk he gives the landlord, as his share, about 9 lbs. of cocoons per box of silkworm eggs reared, and a third of the crop of cocoons as the share of the foreigner who supplies the eggs. The landlord also receives one fowl a year from every family. Rice is separated from the stem by driving horses or donkeys over it, and not with the flail as elsewhere in Gilan, and it is husked by means of the "abdang" or tilt-hammers driven by water-power mills.

We leave Nowdeh and reach the lazy stream of Lazarjan, and a little farther the Ab-i-Khoshkehrud, which is very broad and in spring-time can only be forded further up at Razi Mahalleh. The country around is well wooded.

Above Chaijan are the "yailaks" or summer quarters of Jurdasht, where are a "kalleh" or fortified village and the shrine of Nur Abbas or Noghreh Abbas. After the Ushian Rud are a few other brooks, and then comes the muddy Achedrud, also called Khoshkehlat. The mountains here descend to within 2 miles of the coast, and the river, nearly dry at present, stops all traffic when in flood. A bit of jungle and the Cheshmeh-i-Malekjub have still to be traversed before reaching Chabuksar and its stream. Then comes the Miandehrud, dedicated to Aga Seyyed Jaffar, a saint buried in Miandeh. The fishery rights are vested in the inhabitants. They were let for a year, but no fish were caught during that period, and no lease was entered into subsequently.

Miandeh, concealed in the forest, is 8 miles from Ab-i-Garm and 2 miles from Sefid-Tamisheh. It is said that panther and tiger were shot here

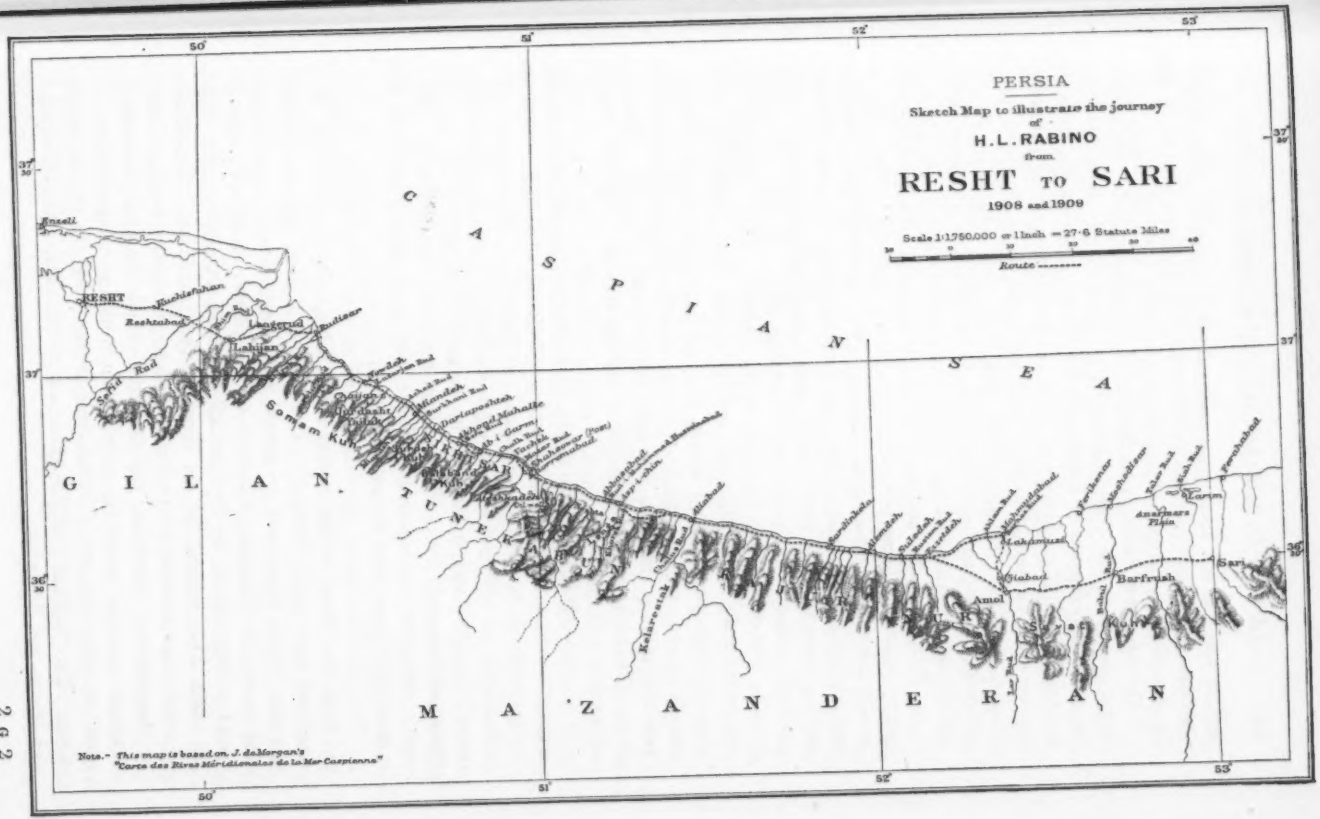
many years ago, but it is doubtful whether any are now found. The Jurdeh hills, the summer retreats of many of the people of Tunekabun, rose above us to the right; in front were the Sakhtsar hills, and to the south-south-east and beyond it, the Mazanderan hills were visible in the distance.

The Surkhani stream marks the boundary of Gilan and Tunekabun in Mazanderan, and on the other side are the pastures of Sefid-Tamisheh, with the huts of numerous cowherds who winter here. Rounding the Sakhtsar hills, which reach nearly to the water's edge, we continue through jungle to Dariaposhteh, about 4 miles from Ab-i-Sakhtsar. The Mahalle of Dariaposhteh is rich in fields and mulberry plantations. We ford the Turkrud three times, pass through Akhond Mahalle with numberless orange trees, cross the Sefarud or Ab-i-Sakhtsar, the bed strewn with large boulders, pass the fine village of Narenjbon and cross its stream over a small brick culvert, and eventually reach Ab-i-Garm.

Sakhtsar, a small district of Tunekabun, is divided into Sakhtsar "ra'yati," belonging to the peasantry, and Sakhtsar "hukumati," belonging to the governor, *i.e.* Sepehdar-i-Azam and his clan. The produce of the plain is chiefly rice and silk. The cocoons are inferior to those of Gilan, but silk fabrics of various designs are manufactured, those of the village of Ramak being much prized. Felt is manufactured in Akhond Mahalle. Much honey is produced, and the rivers abound in fish, the fishery rights being vested in the inhabitants, who, however, are not allowed to export fish. Cattle and sheep are owned in large numbers. The fruit trees consist of pear, plum, apple, quince, mulberry, grapes, figs, and many varieties of lemons and oranges. In the forests are elm, maple, oak, aspen, willow, "bidmishk," acacias of various kinds, boxwood, "palam," "aj," wild medlar, "tui," and "jelam." Most of the inhabitants spend the summer months in the mountains, and only return to their villages towards the beginning of winter. The mountains south of Sakhtsar are known under the general appellation of Balaband or Jurband; and beans, wheat, and barley are grown there in small quantities.

The inhabitants of Sakhtsar "ra'yati" are mostly Seyyeds; the language spoken is Gilek. The men wear tightish blue linen drawers and a sort of jacket open at the breast, of the same colour, both considerably patched. The women are neater in the matter of apparel.

Sakhtsar is celebrated for its hot springs which are at Ab-i-Garm. There are six large and many minor ones; they are shallow, and one is reserved for women and surrounded by a rude stone wall. The largest, named Ab-i-Garm-i-Buzurg, is at 114¼° Fahr.; the second, called Bacheh-Garmab, at 111° Fahr.; the third, that for the ladies, 109° Fahr.; the fourth, named Anjirehbon, is 98° Fahr. On the left bank of the small river a little further down are two others, Khalak, which is 98° Fahr., and Sangehbon, 101° Fahr. These waters, especially Ab-i-Garm-i-Buzurg, contain much sulphur and hydrochloric and carbonic acid gases; there


PERSIA
Sketch Map to illustrate the journey
of
H. L. RABINO
from
RESHT TO SARI
1908 and 1909
Scale 1:1,750,000 or 1 inch = 27·6 Statute Miles
Route
C A S P I A N S E A
G I L A N
M A Z A N D E R A N
RESHT
Enzeli
Lahijan
Sowm Kuh
Amol
Barfrush
Sari
Note.- This map is based on J. de Morgan's "Carte des Rives Méridionales de la Mer Caspienne"

are likewise iron and lime with a small admixture of salts. The people of the country only use them externally and follow no diet; they go to them for skin diseases, rheumatisms, and the after effects of fever.

The hills from Sakhtsar to Barfrush form a magnificent amphitheatre rising one above the other, having many spurs which slope down from the snow-capped peaks of Jurdeh and Do-Hezar. Between the mountains and the sea are fields which produce the much-esteemed rice of Tunekabun, and the roads are as bad as the terrible paths of Gilan; the shore, also, is yielding sand and shingle; horses sink over their fetlocks in it. The shores of the Caspian from Rudisar to Abbasabad offer but little variety, and the same features distinguish the whole line of coast.

At Ramak we stop half an hour to buy silk stuffs. There are no shops, and we sent from house to house to ask what is for sale. These silks are usually taken to the periodical bazaars. We pass Chavarsar, Shurabsar and Seyyed Mahalle, which latter has extensive mulberry plantations and kitchen gardens, cauliflower being grown in plenty, and then through jungle to a small swamp to reach the beach where we cross the Barashi stream, near the mouth of which is the village. The road then leads behind sandhills to Mishehkelayeh and the Pehdar Rud. After that comes Niasseh, from which, to the Mazar, is a bay 8 miles in length. We pass the Zaminjrud and Padengrud; near the mouth of the latter, some Baku rice traders have erected a few huts and buy and ship rice. The next is the Chalkrud, the bed of which is 150 yards wide, while the stream abounds in salmon.

Our road still lay over the sands, which we occasionally leave to pass a green meadow. On the beach were a few shops for the storage of naphtha in tin cases or in large earthenware jars buried in the ground. The inhabitants of Guleijan are mostly from Eshkever; a few come from Gilan, Talagan, and Alamut. The language generally is Gilek. The principal product is rice. Silkworms are not reared in the district. Much cattle and sheep are owned. Fig trees and pear trees grow well, but orange and lemon trees are not to be seen.

The Ab-i-Kerimabad, the Ghusari and an arm of the Mazar, separate us from the Mazar or Shahsowar river, behind the bar of which were anchored some eight "kerejis." The Mazar is shallow, and has a pebbly bottom. From Shahsowar we turned south-east, entered open country, and crossed the Mazarlat, following it for a quarter of an hour, then the broad pebbly bed of the Cheshmehkileh torrent, almost dry, after which we reach Khorremabad, at the house of the Amir-Assad. Tunekabun, of which Khorremabad is now the chief place, is the most westerly district of Mazanderan. Siahrestak and Gezafrud, which are small enclaves in Ranikuh and not under the jurisdiction of the governor of Gilan, are often mentioned as part of Tunekabun, as they belong to the Sepehdar-i-Azam. The "yailaks" of Tunekabun are on the mountains of Do-Hezar, Seh-Hezar, and Eshkever.

The produce of Tunekabun is rice, much esteemed for its whiteness and delicacy, silk, ghee, and wool. Tea has been introduced recently, and a small quantity is now grown. Flax and sugar are no longer cultivated. There is a great abundance of oranges and lemons. In the forests, among a great variety of other trees are boxwood and many oaks of great size. The rivers are rich in fish; many cattle and sheep are owned. Beans, wheat, and barley are grown in the highlands. The industries are the manufacture of silk cloths of every description, woollen tissues called "shal," felt, cloaks for the peasantry styled "shukka," and coarse linen or "katan." Rugs or "gilims" are also manufactured by the tribeswomen.

There are eleven great clans in Tunekabun, viz. Khalatberi, Gavi-Ussallu, or more correctly Gavi-Hessarlu, Kalantarieh, Faki, Talesh Guleij, Daj, Assas, Shurej, Talagani, and Rudbari. The chiefship of the district has been hereditary in the family of the present Sepehdar-i-Azem since the end of the eighteenth century, when Mehdi Beg Khalatberi, who, together with Hajji Mohammed Ali Rudbari and Aga Kazem Faki, went to Shiraz to complain of the oppression of the Gavi-Ussallu governor, received from Kerim Khan Zend the title of Khan and the governorship of Tunekaban. The yearly revenue derived by the Sepehdar-i-Azam from his properties in the Mahal-i-Salaseh was estimated locally at 300,000 kharvars of rice and 20,000 mans of ghee.

The Khojavends are divided into ten branches: Siahserani, Sharafvand, and Shahsavend in Kajur; Garrussi, Kurdistani, Kakavand in Pul; and Sangzorali, Malamiri, Kermanshahi, and Turk in Kelarestak. A small branch is called Sunni and numbers one hundred families of the Sunni persuasion; but their chiefs have become Shiahs. The majority of the tribe are Aliullahis and venerate Abdul Azim Mirza of Kermanshah. The Leks inhabit Kelardasht and have four branches, Karak, Dilfan, Turk, and Nanakali. These tribes, with the Abdul Malekis, were brought from Ardalan and Garrus by Aga Mohammed Khan Kajar, to protect Tehran against any rising of the inhabitants of these parts, then noted for their turbulence.

The tribes, although now inhabiting villages, still move about in tents during the hot season. They keep cattle, and raise a fairly good breed of horses. They also cultivate the ground, most of their fields being "daimi," *i.e.* not requiring artificial irrigation. The "zaminkharaj" or land tax they pay is very small. A few "jajims" and carpets are woven by the women. The Khojavends, as a whole, are hated by the other inhabitants of these parts, not only on account of their religion, but principally because they occupy the best "yailaks" of the district.

Khorremabad, the chief place of Tunekabun, is situated amongst rice-fields in a green and pleasant prairie about 5 or 6 miles from the foot of the nearest hills, 2 from the Caspian, 8 from Zavar, and 16 from Abbasabad.*

* It is five stages from Khorremabad to Tehran: these being Maran, Alamut, Talagan, Kurdan, and Tehran.

It numbers about 250 houses scattered through the thicket, has a telegraph station which connects it with Resht, and a good brick caravanserai built recently by Amir Assad. The fine gardens belonging to the late Saad-ed-Dowleh, the Sepehdar-i-Azam, and the Amir Assad surround the Sabz Maidan on three sides. The Sepehdar's garden has many cypresses, orange, and lemon trees of numerous varieties. The port of Khorremabad is Shahsowar, which has a customs officer under whose supervision are the small ports of Abbasabad, Neshta, Chalkrud, and Shirud. A few Baku merchants engaged in the rice trade reside here, and near the beach are a villa and garden belonging to the Sepehdar. The Mazar, which is not navigable, only affords shelter behind its bar to the few "kerejis" used in unloading the steamers which anchor in the roadstead; it is formed by three streams, the Valumrud, Do-Hezar, and Seh-Hezar. Salmon are plentiful.

Having heard of some oil wells in the district, we started to visit them. Leaving Khorremabad at 8.15 a.m. for the Kurju, passing Habashehbur, we enter the jungle. The road lies through well-cultivated fields, and is very winding, as the intention of the Sepehdar-i-Azam, when constructing it, was to afford means of communication to as many villages as possible. Many "galesh," or cowherds, were on their way from the Mianband, or mountains between the "yailaks" or summer quarters and "keshlaks" or those of the winter, to the bazaar of Khorremabad, it being market day. The forest became thicker as we ascended, some of the oaks having a girth of 36 feet. We finally reached a spot called Ateshkadeh, or the fire-temple, at the foot of the hills about 4 miles from Habashehbur, and were shown four wells. They were shallow, only one being 12 or 15 feet deep, in which were three small jets of gas, which had been lit four days previously, and were still burning. A greasy substance floated on the surface in two of the wells, but it is certain that no oil had been obtained here for at least many centuries. The name "Ateshkadeh" indicates, however, that there stood a fire temple at this spot, further confirmed by the existence of low mounds and broken bricks near by. The district was formerly named Tashkon (tash = atesh, or fire; kon = making), and there is still a village of this name not far from Ateshkadeh.

Seventeen years ago the Sepehdar, thinking his fortune was already made, had the wells dug. In one of these the sound of gurgling water was plainly audible; but as the workmen went down lower, they somehow or other set fire to the gas, and were so terrified that they refused to continue the work. Oil was reported from Mazarlat, near Khorremabad, and from Hassanabad, in Kajur, but no indications of it could be found. As Tunekabun is on the longitudinal axis of symmetry of the Caucasian oilfields, and as we also find indications of oil in Semnan and in Hezarjerib, we may safely infer that oil does exist in Tunekabun, but at what depth and whether in paying quantities it is difficult at present to tell.

Shahsowar and Khorremabad are in the subdistrict of Khorremabad-Tawabeh, the largest in Tunekabun, although it only extends along the coast from the Mazar, west, to near the Tirpordehsar, east. The subdistrict of Zavar extends from Tirpordehsar to the Izarud. The Halikaleh, which joins the Tirpordabsar at its mouth, is crossed by a wooden bridge.

After Halikaleh we reach Palat-Kela, with extensive groves of orange trees and a small stream of the same name. Passing through the jungle in which lies hidden the village of Fakiabod, and which nearly reaches the beach, we come to the Izarud, and then a rivulet, the Sultan-kela, where begins the subdistrict of Neshta. The subdistrict of Neshta numbers about a thousand houses, but only a small proportion of its fields belong to the cultivators. Medlars, box trees, wild pomegranates, brambles, etc., abound in the jungle up to the Pasandehrud. These jungles near the sea in which pomegranates usually abound are termed "Anarkaleh."

Lenga district, of which Abbasabad is a village, is bordered, west by the Kasemrud, south by Mashalabad, and east by Asp-i-Chin. The principal product is rice; flax is also grown, but in small quantities. The "alijeh" or silk fabrics of Lenga are celebrated. Lenga is divided into Jorband or Balaband, usually known as Lenga, and Painband or Jirlang. The low wooded hills which separate the plain from the "yailaks" are known as Mianband. The inhabitants of Neshta, Zavar, and Lenga go to Dakuh (Pish-Dakuh and Pas-Dakuh) for the summer. In the mountains behind Neshta are Siahmoshted and other localities. Oak and "kurzel" leaves are stored, and given to the cattle in winter. Acacia pods and leaves are also given fresh or dry to the cattle, and whole branches of these trees are ruthlessly cut down, so that the trees rarely reach any great size. "Leileki" pods are also stored as food for the cattle in winter.

Leaving Abbasabad, the first part of the road was very good, through grassland between the sea and the rice-fields to the river of Muhammad Husseinabad. Then Pakibagh, where mulberry plantations had been recently laid out, although the village has been abandoned and its inhabitants gone to Umichkela. After Umichkela the road traverses open jungle for about a mile, with some fine forest trees. There are remains of an old castle called Asp-i-Chin, where a certain Osman Khan dwelt in bygone days, or maybe it was an old Tartar fortress.

Again through a jungle of lofty box trees and close to the sea; 2½ miles from Abbasabad, cross the Kharek Rud, a very winding and sluggish stream. On its right bank is the Mahalle Jemshidabad; hence two roads, one along the beach, the other through the jungle. We followed the latter; in it we saw quantities of medlars, sour plums, and alder trees. Arriving again on the beach, 2 miles from Jemshidabad, where two streams flow into the sea, we again entered the jungle, and threaded our way through the brambles and acacias to the sandy beach, where we forded the Ispehrud.

At Palangehrud were piles of oak planks ready for transport to Russia, which had been brought by some Austrians, who tried to launch a company for the exploitation of the forests of Tunekabun and Kelarestak, but failed.

We cross the Hachehrud, pass Imamrud and the Sardabrud, which runs down from the "yailaks" of Kelardasht, and near the mouth of which is a Russian fishery station. Then comes the broad stream of Chalus, about 19 miles from Aliabad, from the Dalir and Nur hills, forming the boundary between Kelarestak and Kajur. There is a fishery, where salmon and other fish are caught. The district of Kelarestak extends along the coast from the Namakabrud to the Chalus, and wheat is grown in the hills, but the chief riches is in cattle, with many sheep, all with short tails, known as "zar." The summer road from Chalus to Tehran has four stages—Babudeh, Alamol, Shahrestanek or Imamzadeh-Daoud, and Tehran. The winter road has six or seven stages—Tuvar, Valiabad, Gachehsar, Shahrestanek, Ahar (which is optional), Ushan, and Tehran.

Crossing the Damarud we pass Baharsera, where on the beach were some elevated platforms, where the inhabitants sleep in summer and store rice-straw for the winter. The coast was bordered by sandhills, resembling the dykes of Holland, and the shore was of heavy sand, through which our horses had hard work to labour. The traveller on the shores of the Caspian knows he is near the mouth of a river long before he reaches it, as in fine weather a long silvery streak of fresh water forces its way a great distance from the shore; in rainy weather the streak is mud-coloured red. Habibabad numbers sixty-five houses, and is pleasantly situated near the beach, watered by the Khachek and Cheshmeh-i-Ab streams. The produce is rice and onions.

Crossing several streams, from Mashelek rode for 2 miles over a mass of limestone, bordered by heaps of castaway wood, we pass the large village of Aliabad-i-Buzurg. Then over hard ground through a scattered jungle of box, sour pomegranates, sour plums, acacias, "leilekis," medlars, and jasmin (mixed with these were crab-apples and wild figs), arrive at the Rudkhaneh Amir-Rud. After which we pass the Kheirrudkenar, a broad and formidable stream at times, its bed calcareous and now nearly dry. It gives its name to the small subdistrict of Kheirrud-kenar, or Khizrrudkenar. We are now in the jungle of Bandpoi, and come to the Satulkia Sultan (Sultan Ali Kia Sultan) stream. Here on the beach was much firewood, ready to be shipped to Russia by sailing vessels.

Passing Mulkar, we re-enter the jungle, where boxwood was principally to be seen, cross the Anarvar stream, and pass Aliabad near the stream of the same name, and then come to two streams, the Naorudbar and the Khoshkehlat, both dry, beyond which is Sardinkela. Here we put up at a coffee-house on the sandy beach. There was a cistern for storing naphtha oil, and on the beach, buried under branches and leaves

to protect it from the sun, was a large "kereji," used for unloading naphtha from steamers in the roadstead. Sardinkela (Salah-ed-Din-Kela) numbers one hundred houses, and is in the jungle 200 yards south of the beach road.

The inhabitants of Kajur are Khojavends and Gileks, each having their own governor. The inhabitants of Tunekabun, Kelarestak, and Kajur, formerly part of Rustamdar, do not call themselves Mazanderanis; but on the other hand, the Mazanderanis say they are Gileks. From Sardinkela to Tehran is four stages: Kajur, 4 farsakhs; Nur, 4 farsakhs; Afsheh, 6 farsakhs; Tehran, 4 farsakhs. Total 18 farsakhs, or 72 miles. We cross a succession of small streams and pass Falimarz, with extensive ricefields. The next stream was the Siahrud. From here to Mahmudabad are sand-hills skirting the beach, behind which are swamps where natives catch wild ducks by decoys.

The district of Nur begins at Alemdeh. At Suledeh, near the beach, are thatched huts for storing rice to be shipped to Russia. The place contains two hundred houses, twenty shops, and has a brick bridge of three arches over its stream. The hills visible from Suledeh are Sardar (to the south-west, covered with snow), Lashkenar, Pimat, and Labij; and the country between them and the sea is open or covered with thin scattered jungle. The cultivation was rice, the swampy fields of which are almost as unwholesome as the jungle of Gilan, and quite as difficult to traverse. The method of building is somewhat faulty; either a total absence of air or else too much of it. The former in the houses of the peasants, the latter in the dwellings of the better class. Almost every house has its sleeping-place or "talar" in the courtyard or garden; it is usually two storeys in height, and consists of a framework of beams with a planked platform above for sleepers. For privacy, curtains made of split reeds bound horizontally with string to admit both light and air, are hung around. The reeds are of gigantic size, and are generally useful for many purposes. The roofs of the "talar" are generally of thatch.

We follow the beach to Rustamrud, where the sanddunes are high and covered with grass and brushwood. Crossing the Hashemrud we reach Ezzetdeh. From here the hills of the Kajur district lie west-south-west, and from it the Elburz mountain rises in the form of a semicircle, of which the last distinguishable portion from Ezzetdeh lies south-east. Snipe and pheasant were plentiful in the fields round the village. The district of Nur extends along the coast from the Sulehdeh stream to the Ahlamrud, but away inland it is of far greater extent, and reaches nearly from Kelarestak, to the Harhaz river. To the south it is bounded by the Lar and Larijan mountains. Lovett, describing upper Nur, says, "The valley is very arid, and it might be in the highlands near Ispahan or Shiraz, so far as the hills enclosing it and the villages are concerned." The district is famous for its mines; iron, copper, and lead are found not only in the mountains, but also, it is said, in the river-beds. There are some mines near Chumasan and Tenekeh. The inhabitants of Naij make shot from

the lead found in their district. Cannon-balls for the Tehran arsenal were formerly manufactured at Labij, where a few hundred are still to be seen. A foreigner, a German subject, I believe, was engaged three years ago to construct a road from Vanush to Naorudbar for the exploitation of the forest, and also of the iron-mines. Ezzetdeh, also known as Izzedeh, numbers two hundred houses, and produces rice, sugar, some tobacco, and sufficient silk for the requirements of the local looms.

We continue across a green luxuriant plain, and then between tall reeds, to Sutkaleh and the Ahlamrud, a branch of the Harhaz. Hence were two paths, one along the beach, and the other, which we took, led through a jungle of pomegranates, acacias, and barberies, to the Harhaz. We crossed the three branches of this river over bridges of planks. Mahmudabad is 16 miles east-north-east from Sulehdeh, and near the third branch of the Harhaz. Here stands a ruined building of brick with an iron roof which was the former railway station of the Mahmudabad-Amol railway.

Striking south from Mahmudabad, we pass Lakamuzi, a hamlet belonging to Talikehsar, near which are pools of stagnant water in which flax-plants were soaking previous to the flax being detached from the stems. From Tarsu, which produces rice and a little cotton, we again enter the forest, here very thick, and join the old railway track, still constituting the only means of communication between Mahmudabad and Amol. This path, seldom used, is very narrow. Thorns assail one on either side and overhang the track. The forest is of great beauty, and many of the trees are remarkable for their size. Leaving Masumabad on our right, we reach comparatively open country again. Irrigation canals were bridged with old rails. Ujiabad has a large whitewashed villa and garden belonging to the governor of Larijan, Amir-i-Mokaram, and the shrine of Aga Seyyed Masum in a grove of magnificent trees. From here the old tower tombs of Amol are visible, and shortly after we reach the Sabz-Maidan just outside the town.

Amol numbers two thousand houses, and stands on the western bank of the Harhaz river, with two small quarters on the eastern bank joined by a bridge of twelve arches called Pol-i-Dowazda Pelleh. The inhabitants are divided into ten clans: Aski, Erai, Rahnei, Niaki (seyyeds), Shundashti, Delarestaki, Mashai, Amoli, and Nuri, with a few Berberis and Bankashis. Amol is an open town with four "darvazehs" or gates; these are the Tehran or Larijan, Barfrush, Talikehsar, and Nur darvazehs, and the place is divided into nine quarters. The bazaars are large, and contain four hundred shops, well supplied with goods. There are numerous shoemakers, bootmakers, saddlers, blacksmiths, farriers, felt manufacturers, and a single coppersmith. The produce of the district is ghee, rice, wool, cheese, oranges and lemons of various kinds, wax, honey, and walnuts. Woollen socks are manufactured in the city. Rice in large quantities, and cheese and oranges are sent to Tehran, whence are obtained tea, henna, spices, tobacco, velvet, Manchester prints, silks, tin, and native

shoes, and copper utensils. The imports from Barfrush are tea, sugar, cotton goods, glassware, hardware, and iron from Russia, and glass bottles of native make. The exports to Barfrush consist of antlers and horn, ermine and jackal skins, walnuts, wax, honey, and wool. Pomegranates are obtained from Ashraf, and salt from Demavend. The forests of the district have remained unexploited except for boxwood. About four thousand mules used for transport between Mazanderan and Tehran are owned in Amol.

The late Amin-ez-Zarb, about 1888, constructed the railway from Mahmudabad to Amol, hoping to divert the trade from Meshedisar to Mahmudabad. He also intended connecting the iron-mines of Mahun with Amol by rail, but these enterprises, as well as the laying of a wire from Amol to Barfrush, were not a success. The telegraph wire was cut and carried away. Rails are still to be seen between Mahmudabad and Amol, but the sleepers have crumbled away. Mahmudabad was not suitable as a port, and the opposition of the late chief of Larijan could not be easily overcome by the adventurous Amin-ez-Zarb. In 1890 he thought of establishing a large factory which was to contain a saw-mill and a sugar-cane press, but these were never completed, and the machinery has been left to rust in the ruined railway stations of Mahmudabad and Amol.

Amol has suffered much from earthquakes and from the Harhaz when in flood. The inhabitants, when they require bricks, simply dig anywhere to a depth of a few feet, where they obtain as many bricks as they require from ancient ruins. Some of these bricks measure 16 inches by 3, and are known as Guebre bricks. White ants do much damage to woodwork. The principal road from Amol to Tehran, for trade between the capital and Meshedisar, has the following stages: Parasm 19 miles, then to Baijan 23½ miles, Ask 15 miles, Ah 21 miles, Jajerud 11 miles, and Tehran 21 miles; total 110½. Another road leads from Amol to Galiah, Neshel, Arjumand, or Lazur, Nava, Ah, and Tehran; total 36 farsakhs, or about 144 miles; but it is seldom or ever taken by caravans, and the district traversed is little inhabited excepting during the summer months.

Larijan is so enclosed by mountains and narrow gorges as to be almost inaccessible to an invader, and on this account its inhabitants are prone to revolt and refusal to pay revenue. It comprises the whole country watered by the Lar river and the upper reaches of the Harhaz. From the Shelfin pass to the plain the mountains are wooded. The produce of the highlands is wheat, barley, and millet, but not of good quality, on account of the moistness of the climate. In the lowlands rice is grown and forms the principal article of food of the inhabitants.

Mohammed Hassan Khan Etemad es Sultaneh, who wrote an account of the Sharvin mountain, holds that the inhabitants of Savadkuh differ from other Mazanderanis. The former is tall, with good features, curly hair, heavy eyebrows, and thick-set neck. Blue eyes, fair hair, and fair complexions are occasionally seen. The men are good marksmen. The

women are described as having thick eyebrows, black hair, and almond-shaped eyes, and as being handsomer than the men. They not only do all the house work, but also work in the fields and help at the harvest. The inhabitants of this village spend the winter on the shores of the Caspian. Wooden platters, "chukha," and other woollen tissues, with some "katan" or coarse linen, are manufactured.

The forests of Savatkuh are reported to be very fine and to contain a great variety of trees, such as medlar, pomegranate, walnut, apple, pear, almond, "alucheh" (a small plum), mulberry, jujube, and boxwood. Ivy is seen everywhere in the lowlands, as well as varieties of oranges and lemons. The wild animals in these mountains are bear, deer, panther, "arkakli," jackals, and wild goat; and in the lower forests, occasionally, tigers, resembling those of Bengal. Wild boar do much damage to the ricefields. Porcupine, marten, fox, hyena, and wolves are also seen in Savadkuh. The birds comprise rail, quail, "part," pheasant, partridge (kabk-i-kazal, kabk-i-darri, and "teihu"), starling, owl; and in the lowlands, stork, heron, wild goose, and numerous aquatic birds, and a ring dove, "fakhteh," such as is not found in other parts of Persia.

Leaving Amol, we crossed the Harhaz by the Dowazda-Pelleh bridge, and proceeded east. Pain Amjalehpei (Ahmed-Chaleh-pei) numbers forty houses, and is on the left bank of the Kari, a branch of the Harhaz. The produce of the village is 40 kharvars (of 650 lbs.) of rice, a little sugar, garden crops, and a small quantity of wheat and barley. The inhabitants are mostly muleteers.

Barfrush is the chief commercial city of Mazanderan, and lies east of the Babul river on the high-road from Meshedisar to Tehran, about 15 miles from Meshedisar and about as many from the foot of the mountains. The town has 9122 houses with a total population of 45,000. Another account gave the population as 35,000 to 40,000, of whom 742 were Jew, 6 Greek, and 10 to 15 Armenian families. It is the most populous city of the province, owing to its extensive commerce, carried on all the year round. The bazaars are crowded, but dark, badly built, and inferior to those in the great trading centres of the Iranian plateau. Some streets are still crossed by loopholed walls with a banquette behind and a gate, which were thrown up during the Babi revolt. Most streets are paved, the houses are chiefly of burnt brick, and the summits of the walls of the courtyards or gardens are generally green with narcissus and other plants; the gardens themselves contain every variety of "morakebat" (*i.e.* sweet and sour lemons, oranges, limes, etc.), of which there are said to be nearly twenty species. The town presented, no doubt on account of the unusually fine weather which had prevailed for some time, an aspect of cleanliness seldom to be seen in other cities of the Persian-Caspian provinces.

Outside Barfrush to the south-west is the Bagh-i-Shah (Bahr-ul-Irem), a royal garden originally built by Shah Abbas, surrounded by a lake full

of reeds, water-lilies, and abounding in wildfowl, principally wild duck and black waterfowl called "chingar." A brick bridge of twenty-four arches led to an island garden, now dilapidated, with the ruined summer house originally built by Shah Abbas and repaired by Nasr ed Din Shah; it was of the octagonal form in which Persians delight, and built of bricks with stucco moulded in arabesques; its roof had fallen in, and the stairs could not be trusted. It had an inner court full of bushes, and two empty tanks added to its desolate aspect. On the south of the lake was a more modern structure erected by Aga Mohammed Khan, who, like Shah Abbas and his immediate successors, was fond of Mazanderan, and embellished it with numerous palaces. The water of the lake is drawn off in summer to irrigate the neighbouring ricefields, and comes from the Babul by a stream called Akrud. I hear that since, the Bahr-ul-Irem has been sold, and the last vestiges of the villas are disappearing, the bricks being used for building in Barfrush. A Greek merchant has introduced many exotic plants and trees from Odessa, and made experiments for growing tobacco three years ago. Yew, fir, pine, and cypress thrived in his garden, but out of ten thousand orange and lemon trees several thousands were destroyed by frost a few years ago. The tobacco is a success, but has not yet found a good market.

Meshedisar is the principal port of Mazanderan, and lies at the mouth of the Babul river. It numbers three hundred houses, has a fine custom-house, a telegraph office, post office, and a fishery station. Steamers have to remain in the roadstead. The Babul, like all rivers in Mazanderan, has a bar at its mouth which diverts it to the north-east. The river is navigable for small craft up to Barfrush, and at Meshedisar is about 200 paces wide. Here, as at Enzeli, large reeds are to be seen everywhere; outhouses, partitions between gardens, screens, etc., are made from them. The neighbouring district produces scarcely any rice and only a little silk; the chief products are sugar, flax, beans, and "kalians," or water-pipes smoked all over Persia and made from pumpkins. These latter are very pretty and ornamented with fancy pattern, but extremely fragile. A good many are exported to the interior. A port of importance is Ferikenar, 5 miles west of Meshedisar. It numbers two hundred huts, of which fifty are used as shops, and is on the left bank of a broad stream sometimes called after the village and occasionally styled the Harhaz, of which it appears to be a branch. The population was estimated in May, 1910, at 800.

On the maidan at Ferikenar was held, in former days, the great fair known as "khamseh bazaar," which opened forty days after the vernal equinox and lasted a month. Native and Christian merchants came from all parts of Persia and the Russian Caspian ports. They assembled in such great numbers that sixty or seventy horsemen were required to keep the peace. The total transactions amounted to about a quarter of a million of tomans. Twenty years ago the attendance gradually declined until the fair was finally discontinued some ten years ago.

Of the various districts of Barfrush, Meshedisar produces opium, flax, hemp, rice, silk, and formerly a small quantity of opium. In Rudbast and Kallehbast are grown rice, sugar, and some silk. In Mashkenjiraz the products are rice and silk, with cattle and bees in the villages near the mountains. Bandpai, south of Barfrush, produces silk and cattle. Babalkunar produces some good silk manufactures, and also rice, sugar, barley, and silk. Cattle and bees are owned near the mountains. Lalabad, west of Barfrush, produces rice and also quantities of cattle and sheep. Laffur, south of Barfrush, produces chiefly rice, also cattle and sheep, with a little silk.

Leaving Barfrush, we passed through a crowded square where the usual Thursday bazaar was being held. Glassware was spread everywhere on the ground at the risk of being broken by dogs and horses. A small branch of the Babul was crossed by a brick culvert. Extensive plantations of mulberry trees line the road. North of Azizek is a large irrigation reservoir, which has to be traversed by a narrow rickety wooden bridge. Cross the Talar by a wooden bridge; then through a jungle of pomegranate, reach Banemir. Most of the houses are built on blocks of wood. Much sugar-cane is grown. After Raushandan, entered the jungle of Iznava, where men from Savatkuh were making charcoal. These live in huts of branches, and leave for the mountains as soon as the hot season sets in.

The inhabitants of the small mahal of Chapukrud, formerly part of Barfrush, were at one time settled near the seashore, but as they were constantly exposed to the attacks of Turkoman pirates they retired inland to their present settlements. Rice is mostly cultivated; cotton, barley, wheat, and flax are grown, but in small quantities. The plain of Anarmarz, although in places covered with salt, affords good pastures, which are let at an annual rental of 1400 tomans. The plain between Anarmarz and Larim has but little cultivation; a large mound named Dimteppeh marks some former settlement. Plover abound. Larim has about two hundred houses, and is traversed by the Siahrud, over which is a wooden bridge. On the beach is a large naphtha reservoir.

The country towards Kajjarkheil is an open expanse of saltish ground where numerous cattle graze. During the rainy season it is quite impassable. Proceeding through pomegranate bushes to a meadow, in the centre of which was a hill or tumulus, we reached Ferahabad, and farther north the Bender or port of Ferahabad. Three steamers were at anchor, one discharging naphtha into "kerejis," for storage in a large iron reservoir near the river. The "bender" is at the mouth of the Tijin. There is a fishery station, a customs office and two houses, and a naphtha reservoir belonging to Mir Abu Taleb. Seven "kerejis" suffice for the work at this port.

Ferahabad, 17 miles north of Sari, comprises Daznikendeh and Suteh; numbering all told seventy houses; and has a takieh, and a steam cotton press. The inhabitants hail from all parts of Mazanderan, and in winter

numerous cowherds and shepherds come from the mountains of Hezarjerib. The local products are cotton, rice, garden crops, and a little silk. The culture of cotton has caused people to gradually abandon the rearing of silkworms, and no more than one hundred "mans" of fresh cocoons are produced. Ferahabad, which was a favourite residence of Shah Abbas, was sacked in 1668 by a horde of Cossacks who were led by the famous Stenka Razin, chief of the Don Cossacks. To the number of 6000, they reached Gilan with forty vessels, each carrying two small pieces of cannon; they sacked Resht, after which they sailed to Ferahabad. Chardin describes how "The most considerable and a loss not to be repaired, was the ruin of the King's Palace, a most stately Pile, seated in the midst of the City, wherein was a vast Treasure of Dishes and Basins of Porcellane, or China, Cornaline, Agate, Coral, Amber, Cups of Crystal of the Rock, and other rarities without number, which those Barbarians either broke or carry'd away. They also broke the great Haouse, or Tangi (Hauz-i-Sangi), being a Jasper fountain covered with Plates of Gold, and erected within the Palace." *

We left for Sari, and lost our way in the forest, but at Daznikendeh, mostly inhabited by Seyyeds, engaged a guide, who led us through a forest, rich in oak and other magnificent trees, to Akkand on Shah Abbas's causeway. Traces of former reservoirs and irrigation works in the forest show that this part of Mazanderan must have enjoyed great prosperity under the Safavi dynasty. Following the old causeway, which is here much cut up by water from the ricefields, at Mafrush Mahalleh our horses had to wade through a stream from the ricefields which reached to above their girths. Sari is in the plain nearly due north of the low hills, which have a gentle curve from west-north-west to east-south-east. The place is about 3 miles in circumference, and was surrounded by a wall, some traces of which are still to be seen, and a ditch. Its fortifications were erected by Aga Mohammed Khan, and repaired during the reign of Fath Ali Shah. The principal quarter of the town is Mir Meshhed; and the chief mosque was formerly a guebre temple, near which stood, it is said, the tomb of Fereidun, of which, however, no traces remain. The governor's palace at Sari was built by Aga Mohammed Khan. It was partly destroyed by fire and rebuilt by the Mulkara, Mohammed Guli Mirza, a son of Fath Ali Shah. The "divan khaneh," or hall of audience, is entered by a lofty gateway called the "neghareh khaneh." In the court are two tanks forming the letter T. Traces of frescoes of flowers and scrolls which ornamented the walls can still be seen, but of the paintings mentioned by Fraser and Stuart nothing now remains. Four magnificent plane trees grew in the court.

On the other side of the Maidan facing the Neghareh khaneh is the Bagh-i-Shah, formerly known as the Garden of the Mulkara. The entrance

* The ruins of Ferahabad have been described by J. B. Fraser in his 'Travels and Adventures in the Persian Provinces on the Southern Banks of the Caspian Sea.'

gate was built a few years ago by Abdullah Khan Sardar. It has two upper stories, and here the Governor of Mazanderan usually spends the day. The palace and magnificent tank built by the Mulkara are now in an advanced state of decay. At the time of my last visit to Sari the Nizam es Sultan, then Governor-General of Mazanderan, had interested the various notables in the upkeep of the garden; but, as is so often the case in Persia, the governor was recalled, and the garden was no longer cared for.

To the north of Sari is the old Bagh-i-Shah laid out by Shah Abbas, in the centre of which there stood formerly a tower or Kala Farenghi, from the top of which the Caspian could be seen. The streets of Sari are paved, but usually out of repair, and slope to a gutter in the centre. The bazaars are well supplied with the necessaries of life, and the trade seems lively enough, although in reality it is far from extensive. A variety of silk and cotton stuffs was formerly manufactured in Sari, but now this is reduced to woollen tissues called "chugha," head coverings or "bashluks," and "alijeh," or striped cotton and silk cloths, bathing-towels, and a small quantity of coarse linen. The bread of Sari is said to be rather intoxicating for strangers on account of a plant called "chechum," which grows in the fields together with the wheat and is not weeded from it.

The district of Sari is one of the most productive tracts of Mazanderan, and much rice, cotton, and sugar-cane is grown. Shirgah, which is usually accounted a district of Savatkuh, lies to the south of Ferahabad, on the banks of the Talar; its villages, fifteen in number, are partly in the plain and partly in the highlands; cattle and sheep are its chief riches, and it produces much rice; it has also a moderate quantity of silk, sugar, wheat, and barley.

The western boundary of Mazanderan is the Surkhani stream; to the east it is formed by the Jar or ditch of Kulbad, 4 farsakhs in length. Mazanderan in a straight line is 170 miles from east to west. Its greatest breadth to the south of Meshedisar is about 80 miles, of which about one-third is flat and the remainder mountainous. The distance of the mountains from the coast varies considerably; sometimes, as at Sakhtsar, they sweep down to the sea, forming headlands, at others they form irregular curves, none of which are far from the Caspian. The main range is lofty and bare, but the lower hills, covered with every kind of forest tree, slope by degrees to the belt of virgin jungle. South of the hills the Kuhistan continues, and is styled Hezar-Jerib, Savat-Kuh, Larijan, etc. Its inhabitants are chiefly a pastoral race, but they also cultivate crops of wheat, barley, and millet. Their rice is good, as also their hemp. Their flocks of sheep and cattle are numerous, and they make "roghan," butter, cheese, etc.; with the wool they manufacture "gilims" (coarse carpets or blankets), "jajims," "chokha" for cloaks, etc. They come in great numbers to the lowlands, where they settle during the winter, and are known by the name of "gharib," or strangers.

The Mazanderanis are somewhat more manly than the Gileks, although

there is not much difference between the two. This is perhaps owing to the fact that a great portion of them reside in the mountains in summer, as also to the smaller taxation they have to endure. As far as honesty goes, they are no better than they should be, and they are far inferior in point of intelligence to the Gilek, but are of sturdier mould physically. Owing to the mixture of different tribes brought by various Persian monarchs into Mazanderan, the Mazanderani has not fine features, especially east of Meshedisar, where most of the foreign races are located.

In addition to the aborigines of the province, there are many tribes scattered over the country: Abdul-Malekis, Khojavends, Gerailis, Usanlus, Baluchis, Afghans, and Kurds, who have been brought into Mazanderan at different periods by various Persian monarchs, and who hold their lands by military service. They have become so mingled with the country-folk that they cannot be distinguished from them; apart from the Kurds and a few Turks, they have altogether forgotten their original languages, and they are now Mazanderanis to all intents and purposes.

The Abdul-Malekis were at first settled at Darehgez; they were then removed to Shiraz, and thence to Shahryar, where they remained three years. Aga Mohammed Khan transplanted them to Nur, where they were settled for forty years. They then left their country for their country's good, and were transplanted by Mirza Aga Khan Nuri Sadr Azam, about 1855, to Zaghmarz near Sari. They speak Kurdish, are Shiahs, and furnish 100 irregular cavalry to Government when called upon to do so. The Khojavends came originally from Luristan and Kurdistan. Not only have they, like the Abdul Malekis, preserved the Kurdish language, but they also still adhere to the Aliullahi tenets. The Gerailis were brought from Kalpush by Aga Mohammed Khan, and are found in Anderud, Miandorud, Karatagan, and Aliabad. They are a Turkish race, as well as the Usanlus. The Usanlus were imported by Aga Mohammed Khan. They numbered 150 families in Sari, and many others in the villages, but are now dispersed. The few Baluchis numbered 30 or 40 families settled in Sari, but none are now found.

Some 30 families of Afghans settled at Sari, but were massacred during some disturbances many years ago. There are still 60 families of Gilzai Afghans at Karateppeh, but have almost entirely forgotten their native language. They are divided into four clans: Naseri, Abduli, Soleimankheil, the family of the chiefs, and Taher. They were first brought to Mazanderan by Nader, and at his death retired to the Goklan country, but were brought back by Aga Mohammed Khan.

The Kurdish tribes of Janbeglu and Mudanlu inhabited the villages of Shirkhast, Mianrud, and Ferahabad. I could obtain no information about them. An important Turkish tribe is that of Imranlu, settled in Galuga. It has two great divisions: (1) Imranlu, subdivided into Malek Mahmudi, Mahmud Janneh, Izhaklu, Kallehsari, and Seyyedamli. (2) Kupchi, subdivided into Khadamli, Majirli, Amirkhanli, and Ispendarli. They

number about 600 families, and furnish 50 irregular cavalry to Government. A few Arabs were also brought to Eastern Mazanderan, who introduced buffaloes into Mazanderan and Astarabad.

Besides these, I met wanderers from Bangash, a district of the north-western provinces of India. They were endeavouring to gain their livelihood by a happy mixture of thieving, begging, and working. Both Bangashis and Berbers are ragged and unrighteous races, and not half as industrious as the Karachis or gipsies, who, if they do tell fortunes and impose on the superstitious peasantry, also work as carpenters and blacksmiths, and so turn an honest penny. There is also the tribe of Gaudars, who supply the village watchmen and are hunters and fishermen, although nominally Moslems subsist on the flesh of wild swine. They are generally looked on as the pariahs of the country, and their origin is obscure. In summer they wander in the forest when not employed as watchmen, and in winter live in cabins on the outskirts of the villages.

The climate of Mazanderan is a degree more salubrious than that of Gilan, and would be far healthier in most places but for the rice cultivation which covers so great a portion of the country; on the skirts of the hills, the belt of virgin forest engenders malaria, as in Gilan, but along the sea-shore fevers are less prevalent. With the exception of Shah Abbas's causeway, the roads are chiefly mere tracks through rice swamps, and the former is in most parts to be avoided owing to its neglected state.

Hezar-Jerib abounds in every kind of big game: tigers, bears, etc., which are said to be plentiful. The climate is healthy owing to the mountain air, but the country is infested by the "nalleh," or poisonous bug (sometimes called "shabgaz"), and many venomous serpents, none of which are met in the plains. Hezar-Jerib is bounded on the east by Saver and Damghan; to the south, by Semnan and a portion of Irak; to the west, by Firuzkuh and Savatkuh; and to the north, by different buluks of Astarabad and the lowlands of Mazanderan. There is said to be a lead-mine in Hezar-Jerib. Naphtha oil is reported to exist near the village of Hajjikela on the northern limit of Dodongeh, in the district of Peirejeh, which is situated between Kharchang and Kusul.

The hereditary governor of Yanisar is Mohammed Bagher Khan Salar Akram, son of the late Lutfali Khan Sartip. "Cnokha," a woollen stuff manufactured at Yakhkesh, is much in demand by the people of Astarabad and Mazanderan, who make their winter clothing out of it. There are three qualities: the first, made of silk refuse and wool, and known as "abai"; the second, made of wool and imported cotton-thread; and the third, thick and coarse, made of wool and native cotton thread.

THE FARAFRA DEPRESSION AND BU MUNGAR HATTIA.*

By W. J. HARDING-KING.

THE big oases of Egypt—Kharga, Dakhla, Baharia and Farafra—all lie in depressions in the great limestone plateau that occupies this portion of the Libyan desert. The first three of these depressions and the oases that lie in them have all been surveyed by the Egyptian Government; but the greater part of the Farafra depression was entirely unexplored in the spring of 1912, as the time at the disposal of the Government surveyor, Mr. Beadnell, for making this survey proved insufficient, owing to the unexpected size of the area to be mapped. With the object of completing this survey and of finding, if possible, some small undiscovered oases that were reported to exist in this district, I started with a small caravan into the desert at the end of March in that year.

The road left the Nile valley about 30 miles north-west of Assiut and, after ascending its western scarp by an easy pass, emerged on to the limestone plateau above. This road is known as the Derb ed Deri from the Der Muhurug near which it starts. It forms one of the branches of the Derb el Tawil—or "long road"—which runs from Beni Adi in the Nile valley to the village of Belat in Dakhla oasis. In the autumn enormous caravans come into the Nile valley by this road, bringing the date harvest from the oasis of Dakhla; but at other times of the year it is not much frequented. At the end of the second day's march, the Derb ed Deri joined the Derb el Tawil. Close to the junction of these two roads a third road, now disused, branched off due south. This is said to go to an unknown place, called Ain Embares, described as being a well, which gives a small quantity of good water, surrounded by a considerable area of scrub, in which are a few half-dead palms. It probably lies in the northernmost of the small depressions shown in the map in the Royal Geographical Society's *Journal* for February, 1912. Just before Camp V. was reached, another road branched off to the west which leads to Kasr Dakhl. This road is known as the Derb el Khashabi—or the "wooded road"—from the fact that a few small trees are found by the side of it, two days' journey from its junction with the Derb el Tawil.

The sixth camp lay in the centre of the Abu Moharik dune belt, which, at this point, was some 7 miles in width from east to west. This belt of dunes has been crossed at several points, so its course can be traced with considerable certainty. Starting somewhere about the latitude of Cairo and running over the limestone plateau in a south-south-easterly direction, it enters the depression in which Kharga oasis lies at its northern end. There it slightly changes its direction, owing to the wind being deflected by the high north and south cliff on the eastern side of the oasis. It runs through the whole length of the depression and probably ends between

* Map, p 516.

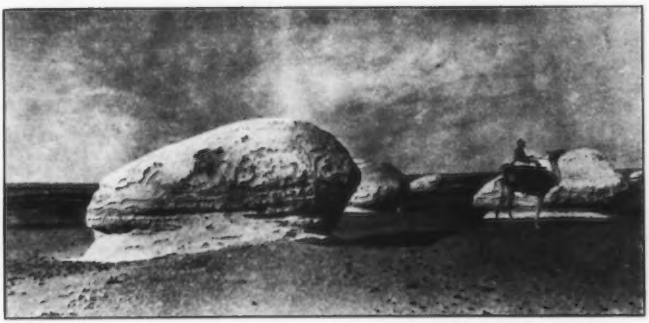
lats. 23° and 24° N. The Derb el Tawil departs slightly from its original course in order to pass through a gap between the dunes, which it traverses without anywhere touching the sand; the dunes, so far as could be seen from the road, were all of the crescentic form and, in most cases, stood isolated from each other.

Everywhere on the limestone plateau the effects of sand erosion were most marked. Natural arches and boulders riddled through in all directions by the sand, till they looked like gigantic sponges, were occasionally seen. At one place the stone had been cut away by the sand blast, leaving the harder boulders that it contained lying isolated on the surface of the desert, forming the type of erosion known as "batiukh," or "water melon" desert. In places the limestone looked as though it had been roughly levelled by a gigantic gouge. This type of desert is known as "rusuf." At intervals all along the route the sand, driven by the furious desert winds, has cut the stone into sharp-edged ridges, a few inches in height, which are very trying to the soft-footed camels that have to cross them. Owing to the prevalence of this "Kharafish" type of erosion on the Derb el Tawil, many of the camel owners carry with them a cobbler's awl, twine, and pieces of leather to "resole" the feet of their camels, should their natural covering be cut away by this sharp-edged rock. The awl is also used for opening blisters in the soles of their camels' feet.

At the place known to the natives as "Rakham," a considerable area of marble was passed—smaller patches of which also occurred at other places along the road. Most of the marble was of a grey colour, with darker grey lines and seemed to be without cracks. Grey with white or black veins and a yellowish stone were also seen. Several patches of rose pink marble were passed. It is possible that these stones might repay working, as some of them were of fine colour and seemed to have a close grain. This was especially the case with the pink stone which somewhat resembled the well-known *rose de Numidie* of the Algerian quarries.

Some 10 miles beyond the dune belt, the road enters a large tract of desert cut up into "Kharashaf"—great ridges of limestone running up to 30 feet in height, the deep grooves cut in the sides of which were most eloquent testimony to the erosive power of the sand blast. The road wound about so much while passing through this area that an accurate route traverse was almost impossible. At a low hill—the Gara Bu Gerara —we left the main road, which here turns off towards the east, and followed a little-used track which took us into unexplored ground by an easy way over the edge of the limestone plateau into the depression below, where there were rumours of a ruined town called Bu Gerara. The aneroid gave the difference in level between the top of the descent near Gara Bu Gerara and the bottom of it as 190 feet, which may be taken as being roughly the height of the scarp at this point.

A short distance beyond the foot of the cliff, Bu Gerara itself was found. Only the site of the place, however, remained. During a stay



SAND-ERODED CHALK NEAR KASR FARAFRA.

NATURAL ARCH, DERB ET TAWIL.

WATER-MELON DESERT.

SAND GROOVING ON KHARASHAF RIDGE.

TABLE EROSION NEAR KASR FARAFRA.

RUSAF.

PERFORATED BOULDER.

here of several days a portion of this was excavated in order to obtain a plan of the buildings. During the process, some old coins and fragments of glass, metal and pottery were unearthed, which were sufficient to date the place as belonging to the Ptolemaic era. It had apparently been a small military station, built to protect some wells that had been dug here. Its chief interest lay in the clear evidence it afforded of the gradual desiccation of this part of the desert. The remains of some palm trunks built into the walls showed that at one time water must have been plentiful in the neighbourhood; but though one of the wells was cleared out right down to the hard pan—about 10 feet below the surface—to which it had originally been excavated, the sand with which the well was filled was only slightly damp at the bottom.

The scarp of the limestone plateau over which we had travelled could be seen stretching far away to the westward into the huge depression in which the oasis of Farafra lies and of which it forms the eastern boundary. To the eastward the view was cut off by Jebel Shushina, which lies on the top of the cliff at its edge, so the scarp almost certainly turns somewhat northwards at this point and forms the northern boundary of the northernmost depression shown in the map in the Royal Geographical Society's *Journal* of February, 1913. The importance of this cliff, which forms the southern limit of the limestone plateau, appears to have been overlooked, for it is the main hill-feature of this part of the desert. Starting somewhere to the west of Iddaila oasis, it runs for some 450 miles—with a break to the north of Farafra—all down the eastern side of that depression past Bu Gerara into the north end of the Kharga valley, where it turns almost at a right angle before continuing in a north and south direction down the eastern side of Kharga to lat. 24° N. and possibly further.

On leaving Bu Gerara the road led us on to the eastern end of a low plateau, lying detached from the higher limestone tableland over which we had travelled. Some sixteen miles further on it descended by the "Negeb er Rumi"—or "descent of the European" over a precipitous cliff some hundred feet high. After another 15 miles an isolated hill was reached where, according to native tradition, the treasure of three Sultans is buried. The last 5 miles of this road lay almost entirely over limestone which also capped the isolated hill. The occurrence of limestone in this depression seems to point to the existence of a fault somewhere between here and the main plateau. On quitting this camp we left the road we had been following, turned off in a north-westerly direction, again crossed the low plateau and entered the Farafra depression. The ground in the depression consisted of sandy soil with occasional patches of flaky clay of a greenish colour with white veins running through it.

It was several days before the sand dunes which cover a large area in the centre of the Farafra depression were seen, as our route followed the eastern cliff in order to look for a small deserted oasis which was reported

to exist near the point where the Derb el Khashabi crosses the scarp. No sign of any oasis, however, was seen. A few miles north of Camp XII., the scarp, which was here much higher than near Bu Gerara, became less precipitous and a man on foot would have had little difficulty in reaching the plateau. From some high ground here, long bearings were taken to the east and west ends of J. Shushu. As it was shortly afterwards lost sight of, its position could not be accurately fixed. Like J. Shushina, it is a long, low ridge standing on high ground and forming a conspicuous landmark; there can be little doubt that it is identical with J. Shushen of existing maps. A few miles north of Camp XIII. the cliff resumed its precipitous character.

The sand-dunes were first seen to the north-west from the road between Camp XIII. and XIV., but it was not found possible to fix their position. They appeared to be only a few miles away; but distances over these featureless, sandy plains are extraordinarily deceptive when the sun is at a high angle. The dunes were not seen again until lat. 27° N. had been nearly reached. One or two miles north of this point our route coasted along the foot of a "sif," or longitudinal dune with an A-shaped cross-section, about 60 feet in height. At this point, the dunes gradually merged into the sandy desert lying to the east of them, so that it was impossible to say where the dunes ended and the surrounding desert began.

Camp XV. lay in the Kairowin hattia. The dividing line between a "hattia" and an oasis is rather vague, and to some places the terms are indiscriminately applied. Broadly speaking, an oasis is permanently inhabited and cultivated, while a "hattia" is uncultivated and either uninhabited or only temporarily resorted to, and may not even contain a well. Mere patches of scrub are sometimes called "hattias." Kairowin hattia consists of a scrub-covered area some 12 miles from north to south by 16 from east to west. Scattered about among the bushes are a few date palms, which appear to be trimmed at intervals and give a few dates. Potable water can apparently be found throughout the whole area at a depth of a few feet, and a number of wells have been dug, to several of which the name Bir Kairowin is impartially applied. A few natives seem to live here permanently in charge of the camels belonging to the inhabitants of Farafra oasis; they live in tents and brushwood huts. The camp was pitched close to some conspicuous mounds, covered with vegetation, one of which was found to contain buildings, constructed partly of rough burnt brick. One small chamber was excavated and found to be neatly plastered with mud. The height of these mounds was about 40 feet, so the buildings were originally possibly towers, similar to those found in other parts of the oases and locally attributed to the Romans. In places between Kairowin and Kasr Farafra, the chalk floor was not covered by sand, and fine specimens of sand erosion in the shape of table rocks and chalk "mushrooms" were to be seen.

On reaching Kasr Farafra, the camp was pitched just to the north of

the village. Physically, the Farafaroni, as the inhabitants are called, are a much more vigorous race than their neighbours of Dakhla and Kharga oases. This they attribute to an admixture of Arab blood. They are great hunters and use several most ingenious kinds of traps for catching gazelle and small birds. A form of crossbow is also used for shooting birds. The plantations were small, but distinguished by the variety of trees they contained. A large number of date palms of course are grown, but in addition numbers of fig trees, apricots, white mulberries, vines, sweet lemons, limes, oranges, a few small apples and a large number of olive trees were seen. The manufacture of olive oil is one of the main sources of income of the inhabitants, considerable quantities of it being exported to Dakhla and Baharia oases and, to some extent, to the Nile valley. At the northern end of the village was a square battlemented tower said by the natives to be of Roman origin. The interior of the tower was a perfect maze of small courtyards and breakneck stairs. It is said to contain 125 rooms—each family in the oasis having the right to use one of them as a store. The building is not inhabited, but is kept locked with a watchman constantly on guard over it, and seems to be used entirely as a common store house. It was presumably originally intended for use as a keep in case of the oasis being attacked. From the top of the tower a good view of the oasis was obtained. In addition to the plantations at Kasr Farafra itself, a number of other wells have been sunk at different places in the floor of the depression, each well as a rule being surrounded by a little cluster of palms and forming, in fact, a separate oasis. A new artesian well was being sunk at Kasr Farafra at the time of our visit.

Our next camp was at Ain Sheikh Murzuk. With the exception of Kasr Farafra, this appears to be the only regularly inhabited oasis in the Farafra group. There are two or three houses here belonging to the same family, the total population of the place numbering about a dozen. Before reaching Ain Sheikh Murzuk, a single bearing was obtained to Ain el Tinin. This place is mentioned by Mr. Beadnell in his report on Farafra oasis, but does not, I believe, occur in his map.

Two miles beyond Ain Sheikh Murzuk, Ain el Agwa, a small oasis with a few half-dead palms was passed, and 2 miles beyond another oasis was found. At this second well—Ain Khalif—the water was more plentiful and the palms were consequently in a healthier condition. Neither of these places are shown in either Mr. Beadnell's map or that of Rohlfs' expedition, though they must have been quite close to Rohlfs' route. From the size of the palms they appeared to be about twenty years old, so probably the wells have been sunk since the time of Rohlfs' visit, but no definite information on this point was obtainable. The remainder of the road was quite featureless until the scarp above Bu Mungar was reached. The descent into the hattia was somewhat difficult, and it was not till long after nightfall that the well where the camp was pitched was reached.

The hattia of Bu Mungar somewhat resembles that of Kairowin ;

the vegetation, however, was much more luxuriant, as the water seemed to be nearer to the surface of the ground. The number of palms it contained in particular being well grown and more plentiful than at Kairowin. The hattia contains a small mud brick ruin, said by the natives, apparently with some truth, to have been built by the Romans. It contains in addition at least two wells. This place has only been found within the last few years. Recently, a prismatic compass survey of it was made by Mr. Donaldson, but its astronomical position had not, I believe, been previously fixed; this was done the day after our arrival. We left that evening, in a tearing sandstorm. We took a more southerly route than that usually followed, striking nearly due south over the sand dunes, camped soon after the moon set, and starting before dawn next day continued our route over the dunes, which stretched as far as we could see to the west and south. It was only near their eastern limit that we found any difficulty in crossing them. Here were two small "sifs," which gave some trouble, as a road had to be scooped diagonally up or down each face before the camels could obtain a foothold. When once these had been crossed, no dunes were met with until the narrow belt to the south of Jebel Edmondstone was reached. These dunes, though of the ordinary crescentic type, were of such soft sand that the camels sank into them nearly to their hocks. The broad belt of dunes that runs to the west of the town of Mut in the south of Dakhla oasis was only seen in the distance, as it does not join up to the escarpment near Dakhla. The route traverse was closed on to Jebel Edmondstone. From there we went to Mut and, after a short stay there to get fresh camels, travelled by the Ain Amur road to rail head in Kharga oasis.

Note on the Map.

The route traverse was made with a prismatic compass and checked by astronomical observations. These positions are given on the map. The observations were taken with a 6-inch vernier theodolite, which was most kindly placed at my disposal by the Egyptian Government Survey Department, to whom—and to Mr. Keeling and Mr. Bennett in particular—I am greatly indebted for calculating and adjusting the observations. The times during the observations were taken with a split second chronograph with reference to a half chronometer watch (No. 24) which the Society kindly lent me. Unfortunately the watch ran down in Bu Gerara, before any observations were taken, so the meridian distance from the Nile valley could not be obtained. Observations were taken here after the watch had been restarted, and as others were obtained in Kairowin hattia, the difference in longitude between these two points could be calculated. The watch had a zero travelling rate while being worn in Camp I., and kept the same rate between Kasr Farafra and Mut. Fortunately, a long compass bearing was very carefully taken from Hameret Wujwaja, near Camp VI. (which was astronomically fixed), to a conspicuous point on the

western side of Jebel Shushina, as the route between these two points was known to be difficult owing to the Kharashaf patch. The relative positions of this peak and the camp in Bu Gerara were fixed by compass survey. The group was then moved in longitude till the peak was on the long compass ray. As the position for the camp in Bu Gerara thus found corresponded to well within a minute of the longitude found by chronometric meridian distance from Kairowin, on the assumption of the zero rate found for the stay in Camp I. and the journey between Kasr Farafra and Mut, this astronomical position was accepted. The watch ran down in Kairowin after a set of observations had been made. Another set was taken when the watch had been restarted, and from these the distance to Kasr Farafra was ascertained. A position for Camp II. and an absolute longitude by lunar altitude in Bu Gerara were rejected as bad; so, too, were some of the pairs of theodolite observations (FL and FR) taken in other camps.

ACROSS THE CHUNG-TIEN PLATEAU.

By F. KINGDON WARD, B.A., F.R.G.S.

Li-chiang Fu, formerly the capital of the powerful Moso kingdom reduced, so it is said, by Hunanese soldiers whose mixed descendants now form the population of the city, is by no means the pretentious place which the designation Fu (since repealed, in the case of all cities save provincial capitals, by the present government) would seem to imply, being but a small unwalled city on the edge of an irregularly shaped plain, 8200 feet above sea-level, and completely encompassed by high mountains. Though the original centre of the Moso kingdom, yet pure Moso are, in my experience, to be found rather in the neighbourhood of Wei-hsi, above the Mekong, than round Li-chiang. Of Tibetan origin, their religion is a form of Tibetan Buddhism, but they have their own priests and monasteries. The mixed Chinese and Moso people of the city and surrounding districts are called by the Chinese simply Li-chiang families, though they still call themselves *pen-ti* (aborigines), resenting the term Moso.

The quickest but by no means the most favoured route between Li-chiang and A-tun-tzŭ is viâ the Chung-tien plateau, a route which on account of its loneliness and its high passes, particularly that over the dreaded Pei-ma-shan, is carefully eschewed by the Chinese muleteers, while even the Li-chiang men can rarely be persuaded to go beyond Chung-tien. Consequently it is necessary to employ Tibetan animals the whole way, waiting in Li-chiang till a Tibetan caravan comes in, or going to Chung-tien with local animals, to change animals there—a plan which I adopted since for botanical work. Chung-tien was a more favourable place in which to be stranded than Li-chiang.

Making a short stage the first day across the narrow plain and up over

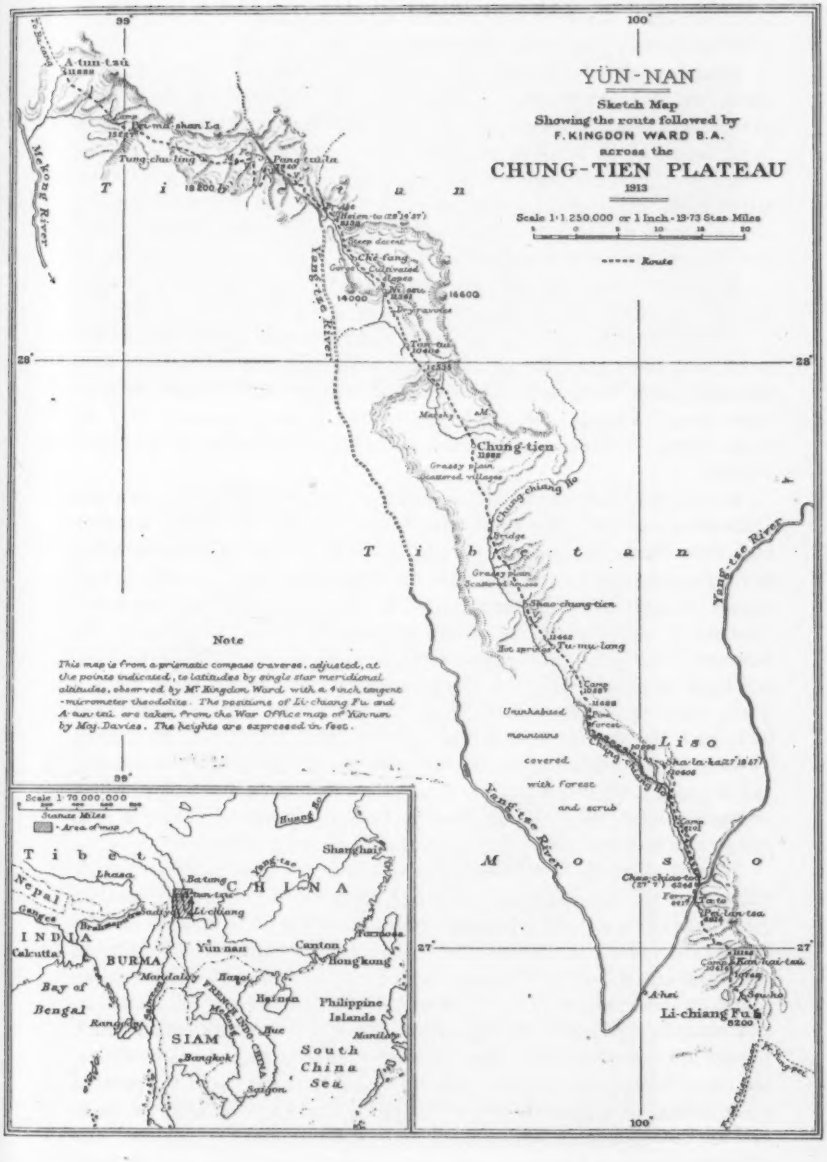
the shoulder of the Li-chiang snowy range, we reached the charming little flat of Kan-hai-tzŭ ("dry lake"), and to the hiss and rattle of a sudden furious squall of rain, pitched camp. The flat, which is surrounded by wooded hills presenting in spring a beautiful mingling of green, yellow, and red leaves unfurling, of gloomy changeless conifers, and of rhododendrons in blossom, and overshadowed to the north-east by the great pile of the Li-chiang range, is completely under water in summer, though at this season the streams from the marshy ground, converging into a deep muddy pit the sides of which clearly display a dozen successive water-levels, find a way out under the limestone rocks. Being far too narrow to drain off the water as fast as it pours into the lake during the rains, however, the exit is doubtless soon choked with silt and rendered useless.

Next day we crossed a low pass and descended to the drier pine-clad slopes of the Yang-tze. Far below rolled the great river just setting out on its long north loop, its yellow water gleaming in the sunshine, its narrow valley bristling with tiny villages and fields of wheat, peas, beans, and not a little of the banished opium. The people are mostly Li-chiang families living in substantial houses of mud and timber, with tiled roofs.

The ferry-boat is a fine big scow, and took our fifteen mules with their loads and about a dozen persons across in one journey. The water was turbid with mud brought down by the melting snow, and the river had no claim now to the name *Fleuve Bleu*, which the French have given it on account of its glorious colour in winter. Though there was a fair current running, not the slightest rapid was visible for as far as we could follow the river with the eye, but a few miles below the ferry, where we turned off to follow up the Chung-chiang, the Yang-tze swings round a corner and suddenly entering a gloomy gorge by a portal not unworthy of the great Bellows Gorge in the famous reaches of Hupeh, bursts its way right through the Li-chiang range, which further west has apparently barred its passage.

On the fourth day we crossed the Chung torrent at Chao-chiao-to, and continued up the narrow valley, generally at some height above the river. It seemed impossible that any fish could make its way up such a roaring cataract, yet here were men scrambling along the edge of the river, casting with long bamboo rod into the whirling foam, and in the evening they brought two fish into camp, fine fellows, brown and speckled like trout, which indeed they resembled, the largest weighing six or seven pounds. It was good eating.

After a night of rain a clear day followed, and the snow-peaks of the Li-chiang range were often visible at the heads of the valleys to the east. Leaving the main river, which for some miles thunders through an impassable ravine, we ascended through magnificent conifer forest, many of the trees attaining upwards of 100 feet in height, and crossing a pass, 10,600 feet above sea-level, descended to a couple of Liso huts and pitched our fifth camp. It was a splendid night, though cold, the stars blazing like diamonds, and here I took my third observation for latitude. All


YÜN-NAN
Sketch Map
Showing the route followed by
F. KINGDON WARD B.A.
across the
CHUNG-TIEN PLATEAU
1913
Scale 1:1,250,000 or 1 Inch = 19·73 Statute Miles
Route
Note
This map is from a prismatic compass traverse, adjusted, at the points indicated, to latitudes by single star meridional altitudes, observed by Mr Kingdon Ward with a 4 inch tangent micrometer theodolite. The positions of Li-chiang Fu and A-tun-tzŭ are taken from the War Office map of Yun-nan by Maj. Davies. The heights are expressed in feet.
Chung-tien
Li-chiang Fu
A-tun-tzŭ
Mekong River
Yang-tsze River
Chung-chiang Ho
Shao-chung-tien
Tu-mu-long
Pang-tzu-la
Tung-chu-ling
Ta-ku-shan La
Ch'i-fang
Grassy plain scattered villages
Unshaded mountains covered with forest and scrub
Li s o
M o s o
T i b e t a n
Scale 1:70,000,000
Statute Miles
Area of map
Tibet
Nepal
Ganges
INDIA
Calcutta
BURMA
Bay of Bengal
Rangoon
Mandalay
Bhamo
Yun nan
Canton
Hong Kong
Formosa
Philippine Islands
Manilla
SIAM
Bangkok
Saigon
South China Sea
CHINA
Shanghai
Lhasa
Batang
Li-chiang
Hainan
Hue
Huang
Yang-tsze

this forest-clad country is very sparsely populated, and after leaving Chao-chiao-to, we had passed none but scattered huts.

Next day, climbing a high spur, we presently emerged on to a ridge far above the Chung river, and continued so all day through pine forests and over plateau country ablaze with pink rhododendron, finally pitching camp in an open marshy meadow at an altitude of nearly 11,000 feet. To the west, the mountains, still covered with snow, though of no considerable altitude just here, are said to be uninhabited right away to the Yang-tze, and all round us the pine forests and scrub-covered hills were as forlorn and deserted as can well be imagined.

At noon next day we set out again, crossed a low pass, and descended abruptly from the wooded country to a broad grassy valley; it required no second glance to convince one that these big square houses dotting the green turf, these scaffoldings, these tall poles with narrow tattered flags fluttering from them, and these herds of shaggy yak belonged to none other than Tibetans. We had entered the grazing country, with all those glaring contrasts which such a fundamental change of livelihood implies.

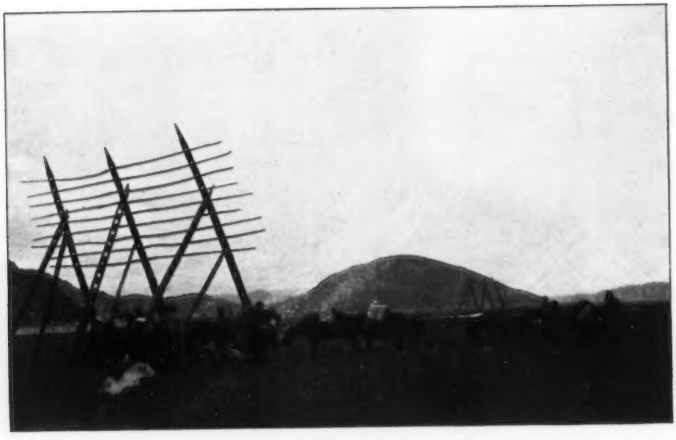
For the remainder of the day, and all next day, we traversed one narrow plain after another. The river, now flowing swiftly but quietly between high sheer banks of sand and gravel, has in the course of its meandering left higher terraces to the east, and the tributaries from this side having cut across them and at the same time left terraces of their own, the valley presents a curious spectacle, in places reminding one somewhat of the Bournemouth chines, in other places of the artificial dykes seen in the Fens. Scattered along the valley are substantial houses, rarely more than a dozen together, usually only three or four; they are not flat roofed, but built with gable ends and roofed with shingles kept down by stones. There is some cultivation, but for the most part the ground is too marshy, and is given over entirely to grazing. Here and there the valley, which averages a mile and a half or more in breadth, is constricted by a spur jutting out from the main eastern range, crossed by a low pass.

Towards dusk on the evening of the eighth day (we had made very short stages, and the last mules had added an extra day's journey) we reached the village of Chung-tien, nestling against a low range of hills which here divides the valley. I was now glad to enter the big dark kitchen of the inn and warm myself by the crackling fire, the leaping flames of which, curling round an immense iron pot in the centre, afforded the only illumination, and indistinctly lighted up the central pillar (a pine trunk round which I could not nearly clasp my arms), the heavy smoke-grimed beams above, the clean family altar with its rows of shining brass cups, and the painted walls fading away into the gloom beyond. I had not been in the room half an hour before an officer in uniform, followed by two soldiers, one of whom swung a lantern a yard high, entered, and accosting me with scant ceremony, spoke thus:

CAMP AT KAN-HAI-TSI, LICHIANG RANGE IN BACKGROUND.

THE YANG-TSE AT THE FERRY BELOW KAN-HAI-TSI.

A CORNER OF CHUNG-TIEN.



A HALT ON THE CHUNG-TIEN PLATEAU.

"Do you understand Chinese?"

"A little."

"Where are you going?"

"To A-tun-tzŭ."

"Have you a passport?"

"Yes, it is in my baggage; I will send it to the Yamen to-morrow."

"You are not going on to-morrow, then?"

"No, I have no mules yet; the Li-chiang muleteers do not wish to go on."

The officer bowed and withdrew, and I was left to reflect further on the rise of western China, the great shadow of a military domination which is slowly overspreading the country.

On the following evening the ssu-wu-chiang, or military official, called and took tea with me, and two days later (being now marooned in Chung-tien for lack of transport) I returned the call, and was entertained for half an hour by the several heads of the military faction. As for Chung-tien itself, situated in the midst of this bleak grassy plateau, at the headwaters of the numerous streams which pour down their waters from the snows to north and east, there is little to be said for it. Solid wide-roofed houses jutting out at all angles into the narrow crooked streets, a fine temple now partly occupied by the soldiers, and the village pump, round which all the gossip of the place is daily exchanged, sum up its external appearance. I made the altitude 11,300 feet, while Major Davis gives it as 11,500, the same as A-tun-tzŭ; the Chinese, however, say that it is higher than A-tun-tzŭ, though they are judging it only by appearances, and by the fact that it is much colder than the latter place.

The people are of mixed Chinese and Tibetan, or perhaps Moso origin, numbering between 150 and 200 families, and the pure Tibetan element finds representation in the big lamaserai at the valley head, 5 miles distant, a village in itself. The various Tibetan tribes, as one may call them for lack of more precise information, or at all events the Tibetans of the various settled valleys and plateaux of the Marches, have each, amongst the women, their own method of binding the hair, which thus forms a good index to where a woman comes from. In Li-chiang it is a single pigtail hanging down; in Chung-tien three pigtails hanging down, but a day's march to the north it is a score or more of narrow plaits gathered together below and continued in an artificial plait of considerable substance, the whole being then bound on top of the head like a low turban. In A-tun-tzŭ the fashion is a single thick plait, artificially lengthened, bound round the head and finished off with two silk tassels. And so on—instances might no doubt be multiplied throughout the Marches. It would seem that the tyrant custom dies harder with women than with men, since the former adhere to many of their own, particularly in the matter of dress, long after the latter have conformed to Chinese fashion. This, however, is less true of the Tibetans, who are little influenced by the Chinese, than

of the smaller and more isolated tribes of Yunnan. In these bigger trading centres where the Chinese have long since established themselves, however much the women may conform to Chinese custom in the matter of dress (and this seems to be little beyond the wearing of trousers beneath the skirt), each still keeps a complete native dress for weddings, festivals, and so on.

After spending four days in Chung-tien I obtained *ula* from one of the officials, and we started again on May 28, with yak and ponies. North of Chung-tien the ground is very marshy, and green as an English lawn, here and there cut up by low hills, between which we presently obtained a fine side peep at the monastery. It was a beautifully clear day, and from the low pass we had a splendid view over the broad plateau, rimmed in on three sides by pale limestone crags which towered above us; to the south-east, near the source of the Chung-chiang Ho, was a fine snowy range, all those streams which rise north of Chung-tien on the plateau itself, apparently finding their way into a lovely little lake situated at the extreme end of the plateau.

Descending to the village of T'an-tui smothered beneath peach trees and golden pæonies, our yak and ponies were next day exchanged for thirty-five porters, nearly all women; soon we were far down in the hot dry ravine, and another march brought us to the Yang-tze, here flowing due south. For five hours we travelled up that ugly bare valley without crossing a single stream of water; toiling up and down the rough-hewn path, the parched rocks flinging the hot air back at us, now a thousand feet above the river, now not a hundred, far away round ravine after ravine, all as dry as the Sahara we travelled, till my lips cracked and I was ready to drop with thirst. At last we found ourselves amongst piles of gravel and numbers of small naked children, coloured gamboge from their occupation of sifting sand in the wind; there were other groups down by the river washing the sand—they were the gold-seekers of Pang-tzŭ-la. Here was the big triangular ferry-boat awaiting us, and we were soon across and climbing up to the village. How warm and sunny it was here! The minimum thermometer did not fall below 61° Fahr., and though we were nearly 8000 feet above sea-level, they were already harvesting the wheat. Two nights later we were freezing in our tents on Pei-ma-shan at 13,700 feet.

For the four days from Pang-tzŭ-la to A-tun-tzŭ over the Pei-ma-shan pass (15,300 feet) we had mostly donkey transport, and A-tun-tzŭ was reached on June 3, where glorious sunshine awaited us after the snow and rain of Pei-ma-shan.

NEW LAND NORTH OF SIBERIA.

THAT the possibilities of geographical discovery on the larger scale are by no means exhausted is proved by the news received during October, of the discovery of new land in the ocean north of Siberia, at no great

distance from the extreme northern point of Asia. While many have been prepared for such a discovery in the great unknown area extending north of Alaska and Eastern Siberia to the neighbourhood of the Pole (the quest of such land being in fact the object of two expeditions now in the field—those of Macmillan and Stefánsson), the existence of hitherto undiscovered land in the much smaller unknown area immediately north of

Western Siberia is more of a surprise. The discovery has been made by the Russian ice-breakers *Taimyr* and *Vaigatz*, which, as mentioned from time to time in the *Journal*, have during the past three years been busy during the season of navigation in hydrographical work in the seas north of Eastern Siberia, to which they have made their way by Bering strait from their winter quarters at Vladivostok. Two years ago we recorded their successful voyage from the strait to the mouth of the Kolyma under Admiral Trajan. In the following season they made

a still longer voyage, apparently under the command of Major-General Sergeieff, but were unable to round the Taimyr peninsula. During the past summer they were in charge of Captain Vilkitsky, son of the well-known Russian hydrographer of that name, by whom much valuable survey work in the seas north of European Russia and Western Siberia was accomplished.

As mentioned in the September number of the *Journal*, the plan this year was to continue the navigation round Cape Chelyuskin and complete the north-east passage in the reverse direction by pushing through to Europe by the northern route. In the brief telegram received in Europe from St. Michael in Alaska, whither the expedition has returned for the winter, it is stated that, finding all efforts to round Cape Chelyuskin fruitless, an attempt was made to find a passage by pushing north, and that this led to the discovery of land stretching for some 200 miles up to 81° N., 96° E. No passage could be found, but whether the land terminates at the point mentioned, or continues farther in a northerly direction is not made clear. It is evident, however, that it cannot be prolonged to any great extent, as it would in that case encroach on the line of drift of the *Fram*. The length assigned to the new coast will apparently bring it down to within some 30 or 40 miles of the mainland, if, as seems probable, its main trend is north and south. The probability seems to be that the new land will repeat to some extent the general character of Novaya Zemlya, though it is possible, no doubt, that it forms an archipelago like Franz Josef Land. It may appear surprising that those who have rounded Cape Chelyuskin (Nordenskiöld, Nansen, Baron Toll) should have had no suspicion of the existence of land in this direction; but it must be remembered that the passage of the Cape has only been effected by hugging the land, the accumulation of ice in this quarter making it sometimes impossible to force a passage even in this way. Fog, too, has frequently obstructed the view. If, as now seems to be the case, we have here something in the nature of a strait, a still greater congestion of the ice at this spot would cause no surprise.

Although Nansen's discovery of a deep Polar basin has been held by himself and others to make the existence of unknown land in the Arctic improbable, many have thought such a conclusion not justified. Thus Prince Kropotkin has pointed out the frequent close association (*e.g.* off the east coast of Asia) of the deepest parts of the ocean with the edge of a continental mass. Even Nansen was cautious about pressing his contention too hard, and in the paper read before the Society in 1907 (*Journal*, vol. **30**, pp. 469, 585) he allowed the possibility that further islands might be found east of the Franz Josef Land archipelago; yet in his bathymetric chart he carries the edge of the deep basin somewhat further south here than elsewhere. He did not anticipate that land would extend so near Cape Chelyuskin, as now seems to be the case, rather considering the continental shelf to be narrowed most of all just

off that cape. In this he was influenced by a record of 68 fathoms obtained by a sounding from the *Vega*, which, if correct, would seem to indicate that the strait is traversed by a fairly deep channel. It should be mentioned that in addition to this discovery, Captain Vilkitsky secured further results in the neighbourhood of the New Siberia group, where he visited Bennett island and found the collections left by the lamented Baron Toll. Fuller details will be awaited with much interest.

The accompanying map shows, so far as is yet possible, the position of the new land and its relation to other known lands within the Arctic ocean.

THE FLOODING OF THE PANAMA CANAL.

By VAUGHAN CORNISH, D.Sc., F.G.S.

On October 10, the dyke at Gamboa was blown up and water let into the Culebra cut from Lake Gatun. The sea-level portions of the canal, between Gatun and the Atlantic and between Miraflores and the Pacific were already filled. Lake Gatun, which comprises 23 miles of the canal channel, has not yet risen to its final level of 85 feet, so that the water in Culebra cut has not yet the full depth of 45 feet. This, however, does not concern the matter now in hand, for the letting in of the water is not for the purpose of navigation, but of excavation. Its admission signalizes a change in the method of excavation which has long been planned. The steam shovels are to be replaced by dredgers. Most of the solid rock which it was intended to excavate has, it is true, been already broken up by blasting, and removed, but the trench thus made has been completely blocked by the renewed activity of the Cucuracha slide. Cucuracha is situated a little south of Gold Hill on the east side of the canal. Here the sedimentary volcanic rocks, instead of lying in nearly horizontal beds as they do north of Gold Hill, have been tilted steeply towards the canal by upward intrusions of several masses of eruptive andesitic rock, between which intrusions the sandstones, shales, etc., lie in troughs or grooves. In 1907, the upper part of these beds glided into the canal and blocked it. Then for some years the material was for the most part at rest. Recently, however, movement began again on a very large scale. The floor of the cut at Cucuracha has been excavated to the full depth at the level of 40 feet above sea, but 600 feet of the channel is now blocked with a mass of earth and broken rock to a depth of 82 feet on the eastern and 35 feet on the western side. We are told that the two oceans were united by the blowing up of the Gamboa dyke on the 10th instant, but, as far as I can make out, the water must have stopped at Cucuracha, leaving dry about a mile of the cut between this place and Pedro Miguel, for the level of Lake Gatun was calculated to be not more

than 68 feet by October 10. The *Times* of October 11 reports Colonel Goethals as stating that the moving mass of the slide reaches to a height of 400 feet above sea, and that about 2,000,000 cubic yards are in motion. If this all come into the canal it will take the dredgers four months to remove it. He makes no assumption as to whether more material will start moving later on, and he refers to the possibility of trouble arising from disintegration of rock consequent upon letting water into the channel. With regard to the latter point, I think it was undoubtedly desirable to get the water in as soon as possible, for the sooner such action begins the sooner will it be finished, and stable conditions attained.

For some time past the Department of Law on the canal zone has been engaged in transplanting the population of the Lake Gatun area. Some families have simply shifted a little higher up, and settled again above the 87-foot contour line. The population of the village of Monte Lirio moved higher up Gatun river and founded a new village which they called Limon. About three hundred and fifty persons have emigrated to the Pacific coast to a spot on the Bay of Panama which the Government of the Republic has reserved for immigrants from the canal zone.

GEOGRAPHY AT THE BRITISH ASSOCIATION.

By E. A. REEVES.

In the papers read before this Section during the recent meeting at Birmingham the scientific character of geography was well maintained, and nearly all branches of the subject were represented. The hall provided for Section E (Geography) was one of the lecture theatres of the Midland Institute; and although this was on no occasion crowded, it was always well attended, and no pains had been spared beforehand by the local committee to fit it up in a suitable manner.

The success of the meeting naturally depends in great measure upon the president, and in this respect the Section must be congratulated upon its choice, for throughout no one could have conducted its affairs better than did Prof. H. N. Dickson, on whom the responsible task fell this year. The excellent work he has done for years past in connection with meteorology and oceanography, together with the important position he holds as Professor of Geography in the University College at Reading, are sufficient evidence of his high qualifications; and, as was anticipated by those who knew him, he performed his duties, both as chairman of the committee and in the general meetings, with marked ability. The vice-presidents of the section were Dr. J. Scott Keltie, Sir Charles Lucas, Captain H. G. Lyons, Colonel C. F. Close, Dr. W. S. Bruce, and Mr. G. G. Chisholm; while the secretaries were Rev. W. J. Barton (Recorder), Mr. J. McFarlane, and Mr. E. A. Reeves. In addition there was a strong committee, consisting of eighteen members, among whom were many leading geographers.

The business of the Section commenced on the morning of Thursday, September 11, with the reading by Prof. Dickson of his presidential address,

which created considerable interest, and dealt with important questions consequent upon the recent rapid expansion of colonization and development of new lands, and in particular with the world's supply of wheat and food generally in the future. This address was published in the October number of the *Geographical Journal*.

After the President's address, Dr. W. S. Bruce gave an account of the completion of his survey of Prince Charles Foreland, Spitsbergen, and exhibited an excellent coloured map of the island, which shows the full results of the whole of the work. The cost of the production of this map has been generously defrayed by the Prince of Monaco. Five years ago Dr. Bruce described at the British Association the surveys of this island so far as they were then carried out, and read a paper on the subject to the Society, which was published, with a map, in the *Geographical Journal* for August, 1908. The complete map, now produced, is on the scale of 1 : 140,000, and gives considerable detail.

The next paper to be read was by Dr. C. A. Hill, on the exploration and survey of Gaping Ghyll, the best known of the Yorkshire pot-holes, situated on the south-eastern flank of Ingleborough hill, at an altitude of about 1360 feet above sea-level, and consisting of a vertical shaft in the limestone 360 feet in depth ending in a huge chamber, from which passages extend for a distance of upwards of a mile. A stream, the Fell beck, is engulfed in this chasm, and reappears at Beck head at a slightly lower level than the entrance to the famous Clapham cave. Dr. Hill gave an interesting account of the early descents of the shaft and attempts at exploring the subterranean chambers, especially those undertaken by the Yorkshire Ramblers' Club, which commenced in May, 1896, and continued at different times since that date. The total length of the passages now known and surveyed amounts to about 2050 yards, and an interesting plan will be found in the *Yorkshire Ramblers' Club Journal*, No. 7, 1906-7. At the present time a more complete plan of the whole is in the course of preparation.

The first morning's meeting finished with a paper by Mr. I. N. Dracopoli, on an important piece of exploration and survey work he has carried out during the past year in British East Africa. However, as this journey and the valuable survey work accomplished were fully described in the *Geographical Journal* for August last, accompanied by a complete map, it is not necessary to refer to it in detail here ; and it may suffice to state that the object of the expedition was fully accomplished, and certainly no more valuable piece of exploration of the kind, undertaken by private enterprise, has been carried out in Africa for a long time.

The Section reassembled on Friday, September 12, and spent about three profitable hours listening to and discussing five papers, all of which related more or less to local geography. The first of these was by Miss C. A. Simpson and her brother Mr. A. H. Simpson, on the Upper Basin of the Warwick Avon. Miss Simpson has been studying at the Oxford School of Geography ; and, as many are aware, an essential part of the training there is that the student during the later part of the course, should go out into the field and make a systematic study on scientific lines, of the geography of some specially selected region. The paper read by Miss Simpson, who was assisted by her brother, was an example of this kind of research work, and contained much useful information and statistical data.

As indicated in the paper, the Avon basin is part of the great valley crossing the Midlands from north-east to south-west at the foot of the oolitic escarpment. Very few of its streams above Warwick are actual strike streams, though there is a line of detached valleys at the foot of the escarpment.

The main streams flow obliquely across parallel outcrops of rock, ranging from inferior oolites in the south-east through bands of lias and triassac marls, to an inlier of Permian sandstone, which is bounded on the north-east by the Nuneaton coalfield. After dealing with the general configuration of the upper Avon, Miss Simpson passed on to facts more or less directly consequent upon this, such as the effect on the scenery, vegetation, arable land, means of communication, and distribution of population. In connection with the latter, it was pointed out that the density of population in per 1000 acres in each parish in the years 1801, 1841, 1881, and 1911 shows a general increase up to 1881, but on the whole, and especially during the later part of the period, the larger towns have increased, and the country districts decreased in population. Another interesting fact brought out was that statistics for the past fifty years show that every year more of Warwickshire is being devoted to pasture and less to cultivation. The paper was well illustrated by maps, diagrams, and statistical tables.

The next paper, by Prof. W. W. Watts, entitled "Notes on the Geography of Shropshire," was an excellent example of systematic and scientific treatment of a special district from a geographical point of view. To commence with, the paper gave a description of the geomorphology and physical features of Shropshire, special attention being directed to the important fact that the Severn, flowing roughly from north-west to south-east, divides it into two parts, which are entirely unlike in general configuration, the southern being a continuation of the Welsh mountains, while the northern part, with the exception of certain minor prolongations of ranges from the south and west, consists of comparatively flat plains with marsh lands near the rivers. The effect of this difference in relief upon the rivers and streams was next dealt with, and shown clearly by slide maps, upon which the comparatively straight and rapid courses of the southern mountainous part appeared in striking contrast to the circuitous and tortuous streams of the flat district to the north. This difference in the relief, and its consequent effect upon the drainage and river courses, naturally has had its effect upon the means of communication, and the paper next referred to this subject, giving interesting information about the roads of Roman and more recent times. The distribution of population, sites of towns and villages, agriculture, and industries were all dealt with in their place from a proper geographical standpoint, and altogether the paper was most suggestive and instructive.

After Prof. Watts, Mr. P. E. Martineau followed with a paper on "The Midland Plateau and its Influence on the English Settlement of Britain." The author of this paper is a native of Birmingham, and during the past meeting of the Association rendered considerable service as local secretary of the Geographical Section. The Midland plateau lying between the Severn, Avon, and Trent, according to Mr. Martineau, measures 46 miles from the north-north-west to south-south-east by 34 from east-north-east to west-south-west. It is nearly 130 miles in circuit, and its area is almost exactly 1000 square miles. It is part of the Triassic plain of middle England, and owes its resistance to denudation and its consequent elevation above the general level of the plain, to a rim of hard rocks by which it is enclosed. The river Tame on the north and the Stour and Alne-Arrow on the south have cut valleys through the weak parts of the rim, and the former drains more than half the plateau. A specially interesting part of this paper was that dealing with the Anglo-Saxon settlement of the country, which was completed during the fifth and sixth centuries, and Mr. Martineau pointed out that the plateau

marks the meeting of the two main waves of colonists, who may be described as the Humber (or English) and the Southampton or (Saxon). Many other interesting matters were dealt with in this paper, such as origin of boundary-lines and place-names.

The next paper was on the "Growth and Development of Birmingham," by Mr. W. H. Foxall. After stating that the determination of the town's position was due wholly to geographical conditions, the author went on to trace its history and growth from its mention in the Domesday Book to the present day. The development of the coal and iron industry in South Staffordshire as increasing the business of Birmingham was specially referred to, and a considerable part of the paper towards the end dealt with the construction of canals, roads, and railways. Mr. Foxall is of opinion that the passing of Acts for the improvement of roads, buildings, markets, etc., in the early part of the nineteenth century marks the beginning of the transformation of Birmingham from an overgrown market town into the chief Midland commercial centre, and that its later progress is due to the industrial skill and inventive genius of its inhabitants, and to that commercial enterprise which has recognized and utilized the advantages that depend on geographical situation.

Friday morning's meeting ended with a paper by Mr. Henry Kay, on the "Black Country and its Borderland." This was the last of a set of five papers dealing with local geography. Five county boroughs, the author stated, and a score of smaller towns crowd the small area known as the Black Country, whilst Birmingham and her suburbs stand at its south-eastern corner. The population approaches 1,750,000, and is perhaps denser than that of any area of equal size outside London. The mineral wealth of the Black Country was briefly described, after which followed a short but interesting account of historical sites, and origin of place-names in the district, from which it was clear that Mr. Kay had made a thorough study of the subject, and could speak from intimate knowledge.

After the usual week-end excursions and rest, the Section reassembled at 10 o'clock on Monday morning, when the first paper read was by Mr. C. B. Fawcett, on "The Expansion of the Fiord Peoples and its Geographical Conditions." The fiordlands considered were Norway, the north-west coast of North America, and Magellanes in the south of Chile. Many characteristics common to all were pointed out. For instance, each of these is a narrow and fragmentary strip of coast backed by barren highland, with only small and scattered patches of lowland. Their climates are all of the same type, wet, cool, and equable, unfavourable to agriculture, but with open sea at all seasons. The people depend mainly on the sea for their food and means of communication. Interesting information was given as to the natural lines of expansion of these fiord peoples, consequent upon their geographical position, and the early raids of the Norsemen on the shores of south-west European countries, specially on those of England. Altogether the paper was one of considerable interest and importance.

Mr. Alan G. Ogilvie next read a paper on "The Physical Geography of the Entrance to Inverness Firth," which gave the results of the investigations he had carried out during this summer, the main object of which was to trace the growth of the remarkable promontories which screen this firth from the Moray Firth. He described the action of the existing tidal currents at various depths, as shown by an examination made with an Ekman current metre, and then pointed out how these currents, co-operating with wind currents and waves, had constructed the cuspate foreland of Chanonry and the complex hook of Ardresier opposite to it. The great length of axis of the cuspate foreland was accounted

for by the gradual growth through at least four upheavals of the land. The probable coastal forms at each stage were suggested, and finally a map was shown, giving in considerable detail the existing relief of the land surface and sea bottom (the latter plotted from original documents in the Admiralty), and the significance of the present land forms was pointed out. Mr. Ogilvie has received a small grant from the British Association towards defraying the expenses in connection with the continuation of this work, which he hopes to be able to complete before long.

Dr. W. S. Bruce next gave an interesting and well-illustrated lecture entitled "Spitsbergen economically considered." After a brief reference to the discovery of the islands, he passed on to speak of the finding of coal which took place more than 300 years ago, but which has only lately been taken advantage of. The position of American and British mining companies was dealt with. The American company is most active so far as coal is concerned. The coal is a long-flamed steam coal of high calorific value, with a very small percentage of sulphur and ash, and was almost equal to South Wales coal. The seams were stated to be of good thickness and cropped out of fairly steep places by the sea, facilitating mining and reducing haulage to a minimum. There were stated to be four British companies engaged in the coal industry at the present time, and another was interested in the gypsum and oil shale deposits. Swedes had begun mining operations in 1872, phosphatic deposits being their object, and the lecturer went on to state that the Norwegians had of recent years hunted there, and Norway was now attempting to appropriate Spitsbergen to herself.

The sitting on Monday finished with an excellent lecture on Australia by Prof. J. W. Gregory, illustrated by some beautiful slides, which was most appropriate in view of the forthcoming visit of the Association next year; and, as might have been anticipated, was well attended and greatly appreciated. The lecturer pointed out that Australia owes its chief characteristics to its antiquity and long isolation. It is the one continent which has no recent fold mountains, and it is essentially composed of one plateau, the area of which has been reduced by the progressive foundering of its margins below the surrounding oceans. Subsidences to a less depth have broken up the plateau dividing it into two main divisions—the eastern highlands and the great western plateau. These two plateaus are separated by the great plains which cross the continent from the Gulf of Carpentaria to the mouth of the Murray.

The political geography was dominated by the contrast of the arid interior and the well-watered coast lands. It has been found recently that the north-west monsoon gives the north-west corner of Australia a more generous rainfall than was formerly thought. The country was first developed by the pastoral industry, which is the main source of its wealth. Its initial success was due to the richness of the pastures on the volcanic soils of south-east Australia. This industry, however, employed so few hands in proportion to the area occupied that the population remained very small until 1851. The discovery of the goldfields then led to the first rapid immigration, and the active development of the continent dates from then.

On Tuesday morning, September 16, Section E met for the last time, and Prof. A. J. Herbertson read a paper, which was followed by a discussion, on "Natural Regions of the World." As is well known, this is a subject that has received considerable attention since Prof. Herbertson read his suggestive paper to the Geographical Society, which was published in the *Geographical Journal* for March, 1905, and the appearance of his Natural Regions wall map.

After preliminary remarks, the author stated that at present attention was

confined to the subject-matter of geography, and the first question is, Has the geographer anything so definite to examine as the botanist's plant, the zoologist's animal, or the chemist's mass of matter? He maintains that he has, that he is not dealing with a fortuitous concourse of sticks and stones, but definite associations of inorganic and living matter with definite structures and functions, with as real a form and possessing as regular and orderly changes as those of a plant or an animal. Those very definite associations are called Natural Regions.

The idea of a Natural Region is not a new one. It has been used consciously or unconsciously by every traveller and geographical student with insight. What was attempted now was (1) to divide the world into Natural Regions, taking into account all the elements composing them; (2) to recognize and group Natural Regions into different classes and orders; and (3) to trace the consequences of the recognition of Natural Regions as entities.

Prof. Herbertson then proceeded to deal with his subject under each of these headings, and when treating of the first did not attempt to deny that the subject was full of complexities, but there were no reasons why the matter should not be dealt with by properly educated geographers in a scientific manner. The Natural Region is a vital unit as well as a physical one, a symbiosis on a vast scale. It is more than an association of plants, or of animals, or of men. It is a symbiotic association of all these, indissolubly bound up with certain structures and forms of the land, possessing a definite water circulation and subjected to a seasonal climatic rhythm.

The advantage of classifying Natural Regions into types is obvious. Some of the larger ones with common morphological or climatic characters have long been recognized, *e.g.* mountain lands, plains, monsoon lands, deserts, the Mediterranean type of region. What geographers are now attempting is the systematic analysis and classification of all types.

Prof. Herbertson further stated that the criteria for geographical Natural Regions are not purely topographical or climatological, for while it is possible to divide the world into regions according to their dominant land forms, and also into regions according to their dominant climatic conditions, it is desirable to lay most stress on the climatic conditions in examining the larger geographical natural regions. In the case of mountainous regions it is, of course, necessary to recognize the complexity of these climatic conditions by differentiating these regions from the adjacent plains; and having done so to classify these mountainous regions according to the mean climate or vegetation condition of their floors and lower slopes.

It is suggested that as a convenient nomenclature for the geographical natural regions each continent should be considered as composed of countries containing different regions divisible into districts, each with its various localities or neighbourhoods. This would not interfere with such political terms as empire, state, province, county, or parish.

As regards Man, Prof. Herbertson pointed out that different natural regions can exist whether he is part of them or not. Even in the most complex group, the continent, he may not live at all, *e.g.* in Antarctica. In some natural regions he counts for no more than other animals, while in others he has so profoundly altered the surface that it is necessary to consider him and his works in any classification.

There was much else that was important in this paper, and the keen interest that was taken in the subject, specially by teachers of geography, was evidenced by the discussion that followed, in which Mr. G. G. Chisholm, Prof. H. J. Fleure,

Mr. J. McFarline, Rev. E. C. Spicer, Dr. Marian Newbigin, Rev. W. J. Barton and the president of the section took part.

Following the discussions on Natural Regions, a paper was read by Mr. W. G. Kendrew on "The Rainfall of China," in which it was mentioned that the data available when the rainfall of China was mapped by Prof. Supan and later by Prof. Herbertson, were exceedingly scanty, and satisfactory only as far as Peking, Zi-ka-wei, and Hongkong were concerned. The deficiency has been to some extent remedied during the past few years, and at the end of 1912 there was produced by Father Louis Froc of Zi-ka-wei a comprehensive and admirably arranged collection of all the reliable statistics for the years 1900–1910, entitled "La Pluie en Chine." From these figures, together with a very few others, maps have now been prepared, and were exhibited by Mr. Kendrew as lantern slides, showing the mean monthly, seasonal, half-yearly, and annual rainfall. The first slide showed the number and distribution of the stations as arranged by Father Froc. The second slide, the annual rainfall, in which no very important difference is to be noticed from the map, by Prof. Herbertson, reproduced in Bartholomew's Atlas of Meteorology; although the upper valley of the Sikiang appears to be considerably drier, and the extreme south-east coastal region wetter than previously represented. Slide 3, January, shows that the lower Yangtse valley and the highlands to the south of it have more rain than was thought in winter, while the country round Canton shows rather less than in former maps. On slide 4, July, it was seen that the whole of China between Manchuria and the Sikiang has heavy and fairly uniform rainfall, the lines differing considerably from those previously shown, but owing to the uniformity of the rainfall this difference is not considered to be of much importance. The south-east coast has heavier, and south-central China less rainfall than shown on earlier maps.

On this last morning of the meeting, while the papers already referred to were being read in the ordinary hall of Section E, those members of the section more intimately connected with surveying adjourned to the committee room of Section A, where a joint meeting of the two sections was held, under the presidency of Colonel C. F. Close, the Director-General of the Ordnance Survey. The first paper was read by Captain H. S. L. Winterbotham, on "The Accuracy of the Principal Triangulation of the United Kingdom," in which an account was given of the recent work that has been done by the Ordnance Survey to check the triangulation carried out in the early part of the last century. As time has advanced, naturally improvements have been introduced in instruments and methods, and the question has been raised from time to time lately as to whether the triangulation of this country is quite up to the same degree of accuracy as those of other European countries, whose principal triangulation is of a more recent date. Although the error could not, of course, possibly be large enough to affect the accuracy of the Ordnance Survey Maps, it has been doubted whether the triangulation was of the high degree of accuracy required for modern geodetic purposes. It may be remembered that this question was raised in the address of the president of Section E at the Dublin meeting of the Association a few years ago, and the committee of the Association took the matter up with a view of using their influence with the Government to grant the necessary funds and facilities to the Ordnance Survey to remeasure the principal triangles if necessary. The mean probable error of an angle in the principal triangulation of the United Kingdom is 1·23″, while that of similar modern surveys is only 0·8″, as worked out by Ferrero's formula. However, this refers only to the angular error, and does not take into consideration the strength of

the various figures and the mean length of the sides. It was therefore decided that before such a serious and extensive task should be undertaken as the measurement of the whole triangulation, a check on the previous work should be applied by measuring a small portion remote from the bases in order to ascertain what linear errors had accumulated, and whether a remeasurement of the whole was advisable. This has now been completed, and included the measurement of a new base at Lossiemouth on the Moray Firth, and a network of triangulation to connect this with three of the original stations of the principal triangulation. The details of this operation and final results were clearly stated by Captain Winterbotham in his paper, and as they will shortly be published by the Ordnance Survey *in extenso* as a separate report, it is not necessary to attempt details here. It must, however, be mentioned that the results are quite satisfactory, and show that the linear errors in the principal triangulation of the United Kingdon are in the same terms as those to be expected in modern work of the kind, and that if the 700 miles of meridional arc between the Straits of Dover and Saxavord in the Shetland islands were remeasured it is not likely that the new measurement would differ from the old by more than 25 yards.

In the discussion that followed this paper, in which Colonel Close, Prof. Turner, and others took part, it was agreed that under the circumstances it was not desirable to proceed further with the matter, and that the money that would be required for the work of measuring the whole of the principal triangulation could be better employed in other scientific objects.

After Captain Winterbotham, in this joint meeting of Sections A and E, Captain H. G. Lyons followed with a paper on "The Need of a More Precise Terminology in Higher Surveying," which will be published in full in this *Journal*.

From the discussion on this paper, it was clear that Captain Lyons's proposals met with approval, and as far as possible publicity should be given to them, so that they may be adopted.

The meeting finished by the reading of two papers by members of the Egyptian Survey. The first by Mr. E. B. H. Wade, and the second by Mr. B. F. E. Keeling. In the absence of Mr. Wade, both of these papers were read by Mr. Keeling. The first dealt with "Longitude Work in Egypt," and gave an account of the determination of the difference of longitude in the last two years, by means of exchange of telegraph signals with Helwan Observatory. Mr. Knox Shaw observed for local time at Helwan, using the Brunner transit instrument, and Mr. Wade employed the method of equal altitudes in the field. All star observations and telegraph signals were chronographically registered and personal equation measured at the end of each expedition. Each station was occupied on at least two nights. The stations referred to in the paper were el Daba'a, Mersa Matruh, Bakbak, Siwa Oasis, and Khartum. The probable error arrived at for an adopted longitude was found to be 0·05 second. Stress was laid on the utility of the method of equal altitudes in field work. The paper also referred to observations for local attraction in the prime vertical as observed by Mr. Wade at the two ends of an east and west line from Helwan to Dagohur. Messrs. Wade and Curry made similar sets of observations south of Biba.

The second paper was by Mr. Keeling on "The Precision of Field Observations for Latitude," and gave the results of observations made for the purpose of evaluating the real precision of the field latitudes of the Geodetic Survey of Egypt. The field programme consists of four pairs of stars observed on at least three nights, the instrument used being a 10-inch Repsold theodolite. As a test of the results obtained in the field, observations were made on the grounds of the Helwan Observatory, following a similar procedure at approximately

monthly intervals for the space of a year, which showed that the mean monthly latitudes were much less concordant than would be expected from the individual probable errors. The monthly residuals ranged from minus 0·9″ to plus 0·9″, and five out of eleven were greater than 0·4″. The probable error of a single month's observations, as computed from the eleven series, was 0·5″, and this appears to be about the proper probable error to assign to the field latitudes of the Egyptian Geodetic Survey.

In addition to the reading of the papers, there were other matters in connection with Section E this year that were of considerable geographical interest, one of which was the preliminary report on the progress made by the committee which was appointed by the Association last year to inquire into the choice and style of atlases and wall maps for school and university use. This committee has spent its first year in preliminary work in two principal directions. One sub-committee has devoted itself to questions of contents and arrangement; another to questions of style and draughtsmanship. The former necessarily had to settle many points before the cartographical aspect of the matter could be discussed with profit, and as it was considered most important to get the general opinion of teachers and others as to what is really required according to their view of the matter, papers with definite questions have been circulated, and a larger number still will be sent out, asking for answers on specific points. These will be fully considered by the committee after they are returned, and it is hoped that both sections of the committee will be able to complete their inquiry and prepare a final report for the Manchester meeting two years hence. A grant of £40 was made to enable the cartographical sub-committee to carry out certain preliminary cartographical experiments.

On Monday afternoon, September 15, an exhibition of school atlases, arranged by Prof. Herbertson, was held in the committee room of the section, and a discussion on the subject, introduced by Colonel Close, took place afterwards.

Another report of considerable importance was that drawn up by the committee on Geographical Teaching in Scotland, which was printed and circulated. It is the opinion of the committee that in several respects the position that geography holds at present in the educational curriculum is far from satisfactory, and it is to be hoped that all who are interested, and have any influence in the matter, will apply at the office of the British Association for a copy of the report and give it their careful consideration.

During the meeting an interesting exhibition of Itineraries, Road-Books, and Maps illustrating the cartographical representation of roads, covering the period 1577 to 1850, was arranged by Sir H. G. Fordham in the library of Mason College; and a very interesting MS. map of London, based on the 6-inch Ordnance Survey, with contours drawn in at 5-feet intervals, with every 25 feet accentuated, was exhibited by Miss Hilda Rodwell-Jones, of the London School of Economics. The map was an attempt to show London as it was before the houses and streets were constructed, with former streams running into the Thames, and was the result of a considerable amount of labour and many miles of walking over the ground to obtain the contours, besides much literary research. It was hung in the committee room of the section throughout the meeting, and created considerable interest.

REVIEWS.

EUROPE.

The Rhenish Palatinate.

Die natürlichen Landschaften der Rheinpfalz. Eine Beitrag zur pfälzischen Heimatkunde.' Von Dr. phil. nat. Daniel Häberle, Kaiserl. Rechnungsrat, etc. In Kommission bei H. Kaysers Verlag in Kaiserslautern, 1913. Pp. viii. and 66. 6 *Illustrations in the text*, 21 *Plates, and a Map.*

The Rhenish Palatinate, having an area of 2290 square miles, is simply a political division established by the Paris treaties of 1814 and 1815, and consists of fragments of several geographical regions widely different in character, owing to their varied geological structure and their configuration. The author has travelled all over the country, and has made use of a large number of books and articles in compiling this treatise of regional geography. The plain of the Rhine, with its 580 square miles, is the best defined natural region, and its trough, filled with the diluvial and alluvial deposits of the river and fruitful loess soil, supports intensive agriculture, producing corn, beet, tobacco, hops, vegetables, and fruit. The Haardt, the margin of the mountains and their skirting zone of hills, with Tertiary deposits, Permian Trias and Jurassic rocks, is a wine-growing district, with 25,000 acres of vineyards, and yields materials for stoneware, porcelain, and glass factories. The Pfälzerwald may be considered the backbone of the Palatinate. It has a length of 60 miles, and extends for a breadth of 20 to 25 miles over the Buntsandstein, constituting, with its area of 520 square miles, about a fourth of the whole territory. Its chief wealth lies in its fine forests, but it also contains quarries and mineral springs. The south-western plateau slopes gently west and south-west, and is diversified by deep winding valleys and low-arched ridges. Though covered with Muschelkalk, it may be considered the western offshoot of the Buntsandstein plateau. The Muschelkalk yields material for walls, plastering, and road mending; mineral springs are common, and in some places the soil is very fruitful. The western moorland, a long hollow in the Buntsandstein, is probably the result of the action of erosion and denudation; it contains large stores of peat, and yields sand for glass manufacture and clay for bricks. The northern mountain-land is not a separate natural division, but part of a region of Permo-Carboniferous rocks extending to the Hochwald and Hunsrück, with an area of about 60 miles long by 25 broad, half of which lies within the boundaries of the Palatinate. Its structure, cultivation, and distribution of population are very varied. Corn, cattle, fruit and wine, and coal are its chief products. The book is worthy of better printing and paper; its geological sections especially might be clearer.

A Deep Boring in Denmark.

'Carlsbergfondets Dybdeboring i Gröndals Eng ved Köbenhavn 1894–1907, og dens Videnskabelige Resultater.' Ved E. P. Bonnesen, O. B. Böggild og J. P. J. Ravn. Köbenhavn: Bianco Lunos Bogtrykkeri. 1913. Pp. 105. 8 *Plates.*

This boring, executed under the direction of Prof. N. V. Ussing, was continued intermittently for thirteen years, and reached a depth of 2824 feet. Prof. Ussing having died in 1911, Prof. Ravn undertook the preparation of the report, with the assistance of Profs. Bonnesen and Böggild. The temperature in the boring, e.. ept in the upper surface layer, about 300 feet down, was found to increase regularly at the rate of 1° F. to 84 feet (1° C. to 46·1 m.). This

length of 84 feet is unusually large, the average interval in other borings being 64 feet. The temperature is given to a high degree of accuracy by Fischer Petersen's formula, $t = 8{\cdot}29 + 2{\cdot}154\frac{d}{100}$, d being the depth in metres, and the temperature expressed in the Centigrade scale. The rock series consists of Quaternary deposits down to 35 feet; Danian beds of very flinty Saltholm limestone, containing remains of *Bryozoa*, to 120 feet; chalk with flints down to 950 feet; white limestone without flints to about 1760 feet; and lastly, slaty marl with layers of white or grey limestone to the bottom of the boring. The chalk and the marl belong to the Senonian series of Cretaceous rocks, as is shown by the fossils they contain. The marl, hitherto unknown, contains much terrigenous material (loam and quartz-sand), especially in its deeper layers, and it is fairly certain that these were laid down in a sea of no very great depth and comparatively near to a coast. The bottom of this sea sank constantly until the marl had accumulated to a depth of 2000 feet; then it rose, only to sink again, and this subsidence continued until near the end of the Cretaceous period. The boring has to some extent disappointed expectation owing to the unusual depth of the formations, and partly owing to the difficulties connected with the petrographic structure. It is the deepest boring made in Denmark, the greatest depth attained previously being only 1310 feet. It is to be kept open in case any one should wish to continue the work at some future time, and meanwhile is available for various experiments and investigations.

ASIA.

'The Fringe of the East.' By H. C. Lukach. (London: Macmillan. 1913. Pp. xiii. 273. *Map and Illustrations.* 12*s.*) The Ægean, Rhodes, Cyprus, Palestine and the parts of Syria beyond Aleppo to the Euphrates are dealt with in this volume, which is concerned with incidents of travel, description, and history. It is vividly written and contains much valuable matter outside the range of the ordinary travel-book, even though the writer did not leave pretty well known lines. Without instituting any comparison in derogation of other chapters, it may be said that the two on Rhodes and Cyprus afford particularly good succinct accounts of these islands.

'Farmers of Forty Centuries.' By F. H. King. (Madison, Wis.: Mrs. F. H. King. 1911. Pp. ix., 441. *Maps and Illustrations.* $2.50.) The late Dr. F. H. King, professor of agricultural physics in the University of Wisconsin, is referred to in the preface to this work as an "agricultural traveller," and it is pointed out with some justice that there have not been many travellers who have been also agriculturists, and that the specific point of view which Dr. King brought to bear on his observations in foreign countries is comparatively uncommon. His chapters in this volume, which is concerned with China, Korea and Japan, deal mostly with individual points—rice culture, silkworm culture, the tea industry, and the like—in agriculture and allied topics; the student of the geography of products may therefore take note of this work, and especially, perhaps, of the chapter on canalization, which contains an interesting sketch-map of the irrigation and drainage canal system in part of Chekiang province.

'A Wayfarer in China.' By Elizabeth Kendall. (London: Constable. 1913. Pp. xv., 338. *Maps and Illustrations.* 10*s.* 6*d.*) This is a book of travel, without scientific pretensions, but commendable for clarity of description, from Tongking through Yunnan and Sechuen, along the Yangtse Kiang to

Hankow, thence to Peking, and across Mongolia to Verkhneudinsk in Siberia It was therefore a sufficiently venturesome journey, and as such well worth narration.

AFRICA.

Eritrea and its Economic Development.

'L'Eritrea economica. Prima Serie di conferenze tenute in Firenze sotto gli auspici della Società di Studi Geografici e Coloniali.' Da Ferdinando Martini, etc., etc. Novara and Rome: Istituto geografico de Agostini. 1913.

The twenty-five years that have elapsed since the Italians first occupied Eritrea have been usefully signalized by an attempt to take stock of all that has been done to develop the resources of the colony, and the results are here laid before us in a volume of 542 pages, with its appropriate collection of photographs. Each chapter is devoted to a separate head treated by a competent authority, and the ensemble presents us with a general account of the country which, though not giving proof as yet of any remarkable resources or striking results, furnishes evidence of slow but systematized progress in every department of administration. The communications both by sea and land, the opportunities for trade, the mines, irrigation, agriculture, live stock, and sanitary measures—all these receive expert and adequate discussion; the whole being prefaced by a general introduction by Signor Ferdinando Martini, the first governor of the colony. Cotton is the most remunerative staple, just as it may be said to be in Egypt, while coffee, rubber, bananas, and other products could be raised with success; but at present the scarcity of labour and population militates against any important development of the country's potential resources. As Signor Martini remarks in his preface, colonization is a slow business, but it is not much more than a century and a half since Canada was declared by Voltaire to be a region frozen up for eight months in the year and inhabited by little else than barbarians, bears, and beavers.

Tribal Movements in Africa.

'Les Grands Mouvements de Peuples en Afrique, Jaga et Zimba, origines des nations Fundji, Shilluk, Galla, Masai, Kamba, Tshaga, Lunda, Koa, Molgache, Yaka, M'Bangala, Songo, M'Bundo, M'Kumbi, Kioko, Lovalé, Shinjé, Bèmba, Rotsé.' Par le Capitaine R. Avelot. Paris: Imprimerie Nationale. 1912.

A vast deal of industrious research in books and articles extending over three centuries of time in the date of their publication and the seven great exploring languages of the world—English, French, German, Dutch, Spanish, Italian, and Portuguese—has produced a work which, though valuable here and there in its conclusions and interesting in its suggestions, is, nevertheless, a disappointment to the specialist; for its author, Captain Avelot, has just missed reading the works of several writers which throw a considerable new light on the migrations of African peoples. I do not anywhere see cited the truly remarkable philological and historical work of Maurice Delafosse, who has done so much to enlarge our ideas concerning past migrations in West and North-West Africa. Although the author refers to one of the earliest and least remarkable of the contributions to Congo ethnography by Emil Torday and T. Athol Joyce, he shows no sign of having read their *magnum opus*, the treatise on the Bushongo people, published by the Belgian Congo authorities at Brussels; or Mr. Torday's other books or various and very valuable contributions to the *Journal* of the Royal Anthropological Institute. And though the earlier works of the present reviewer are frequently quoted, no allusion is made to his compilation

'George Grenfell and the Congo,' in which, through the industry of Grenfell, Bentley, Stapleton, Weeks, and other Baptist missionaries, much that was obscure concerning the past history of the Bateke, Bayaka, Bayanzi, and Bakongo, was made clear. Lastly, and perhaps this is the worst gap of all, no allusion is made to the historical researches of G. McCall Theal.

Dr. McCall Theal, incited thereto by the wish of Cecil Rhodes to lay bare the past history of South-Central Africa, has rendered African historians a great service in clearly printing a large number of original Portuguese documents stored in Lisbon, and giving, in addition to the original Portuguese, an accurate English translation of the same. Thanks to this work of Dr. Theal's we can speak with much greater precision than formerly as to the origin and the migrations of the Bazimba cannibal hordes who devastated so much of South-Central and East Africa in the latter part of the sixteenth century, and actually dealt Portuguese dominion in that direction a blow from which it took long to recover. It is clear from the original Portuguese documents describing the Bazimba (under a variety of tribal names) that these people were identical in origin with the Jaga who somewhat earlier devastated Western Congoland and extended their raids as far north as Loango. Mr. Torday, however, has proved that "Jaga" was simply a term in this tribe for "chief," and that the real tribal name was something like *Jok Kioko*. In other words, the Bajok (Jaga, Zimba) of the sixteenth century were identical with the existing Bajok of south-west Congoland, and like them spoke a language related to the existing Lunda Bantu dialects. That section of the Bajok which directed its devastating raids from the sources of the Zambezi to the lower Zambezi, and thence northwards to Mozambique, Kilwa, and Mombasa, became best known under the name of Zimba, though other tribal names were also applied to them by the Portuguese. Then again, the Segeju who assisted the Portuguese to smash the north-east horde of the Bazimba when the last-named were besieging the island of Mombasa, were certainly not a Bantu people (and probably not a branch of the Masai, as suggested by Captain Avelot), but more likely one of the southernmost of the handsome mongrel tribes formed by ancient Gala invasions of East Africa. At any rate, the fragments of the "Essegeju" which still exist on the north-east fringe of German East Africa, speak not a Nilotic-Negro language like the Masai, but a very degraded form of Hamitic speech allied to Gala.

The author rightly dismisses with scorn the ridiculous theory propounded by Bastian and others that the Jaga of Portuguese history and of western Congoland were identical with the Chaga of Kilimanjaro, and he is right in ripping up here and there theories of Frobenius which make the serious student of Africa writhe with their wild deductions based on wholly mistaken etymologies; but though somewhat more careful in his own theories, the author of this interesting work occasionally goes wrong in his misapprehension of Bantu or West African etymologies.

The author deals interestingly and sensibly with the past history of Madagascar. As the result of his analyses of the writings of a good many students of that island, he is unable to convince himself or his readers that there is any definite proof of the peopling of Madagascar by an African Negro race *prior* to the arrival of the first colonists from the Malay Archipelago, whether the earliest of those colonists were Melanesians or Malays. At the same time, there is at present no justification for asserting dogmatically that Madagascar was never colonized from Africa in ancient times, though all the probabilities are in favour of the view that the large infusion of Negro blood now existing in that island

is to be attributed to the importation of Bantu slaves from the Mozambique coastlands, following on the earliest Arab navigation of those waters at the commencement of the Christian era.

H. H. Johnston.

Zanzibar and British East Africa.

'The Land of Zinj.' Being an account of British East Africa, its ancient history and present inhabitants. By Captain C. H. Stigand. London: Constable & Co., Ltd. 1913. *Map and Illustrations.* 15*s. net.*

Captain Stigand is already favourably known for his many-sided activities in East Africa. He is a close student of the Africa of to-day; the volume before us shows that he is also deeply interested in the past of the continent, at least of that part of East Africa which became the theatre of early Arab colonization and is now largely under British rule. The book has four main themes: (1) the history of Zinj; (2) the Swahili language; (3) a description of British East Africa of to-day; (4) the African and his future. It opens with an abstract of historical events from Arab, Portuguese and other non-African sources which has little that is new in it. It is otherwise with the succeeding chapters, which contain a transcript of statements made to the author by an educated Swahili who recounted the substance of the Pate records. The records themselves Captain Stigand was not permitted to see. Allowing for the Swahili point of view, these native records do not run counter to accepted traditions. They confirm the belief in the appearance of Arabs on the east coast long previous to the Islamic period. To geographers the most interesting point about this section may well be the author's attempts to identify the sites of cities and regions mentioned in the Periplus of the Erythrean Sea and in other documents. Captain Stigand would fix the site of Rhapta on the banks of the Rufiji river, a more likely identification than any site further north, but is not Kilwa a still more likely site?

The chapters on native shipping, Mombasa, and the Lamu archipelago, form practically a continuation and bringing up to date of the historical section. They are a veritable *olla podrida* which the reader will digest with much pleasure. The chapter on the Swahili and their language will provoke criticism, especially from philologists, who will await eagerly further information concerning archaic forms of the language. Captain Stigand's complaint that Roman characters should not be substituted for Arabic in writing Swahili is reasonable but probably unavailing.

Several chapters are devoted to an account of the interior, and here Captain Stigand discloses a descriptive power which enables the untravelled reader to get a clear conception of the country he is being taken through. It is excellent topographical geography. Throughout these chapters are notes on the native tribes, and they lead naturally to the final section in which the future of the African is discussed. Of the author's sympathy with and understanding of the native there is ample evidence, and the sanity of his views is beyond question. They deserve most careful consideration. His conclusions carried to their logical end would indicate that a return to savagedom is desirable for Europeans as well as for Africans, but of that Captain Stigand is probably unconscious. Criticism of his views is fortunately not called for here, but in so far as they concern the position of the Negro, they may be commended impartially to traders, missionaries, and officials.

Frank R. Cana.

Western Uganda.

'Soldiering and Sport in Uganda, 1909–1910.' By Captain E. G. Dion Lardner. London and Felling-on-Tyne: The Walter Scott Publishing Co., Ltd. 1912. *Sketch-map and Illustrations.* 10*s. net.*

Captain Dion Lardner's account of a year spent in the Uganda Protectorate makes interesting reading. A large part of the book is occupied with sporting incidents and adventures (and these are well and modestly told), but its value chiefly lies in the description of the south-west corner of the protectorate, the region, little known, where the Anglo-Belgian-German frontiers have recently been delimited. For some months Captain Lardner was in charge of a detachment of the King's African Rifles stationed at Kigezi, on the skirts of the Mfumbiro region, while a few miles off a Belgian force was encamped. In various journeys between Kigezi and Inbarara in Ankole the captain became fairly acquainted with the district, and being gifted with the ability vividly to picture places seen his descriptions give the reader a good deal of knowledge of this latest addition to the British Empire. It is a land where "capacious lakes, frowning volcanoes, cultivated plains, break on the vision in tumultuous confusion." It is indeed a wonderful country, which some day may become the favourite playground of Europeans in Central Africa, its altitude rendering the climate most enjoyable for white men. Since this book was published a systematic account of part of the region has been furnished by Captain E. M. Jack (*Journal*, **41**, p. 532); but Captain Lardner's narrative contains many details which Captain Jack was unable to present. We get also some curious light on the state of tension which preceded the agreement with Belgium as to the ownership of the country.

For the rest this book shows, unconsciously, for the story is told with evident ingenuousness, that the author was just the right type of young officer to represent Britain in a distant outpost. He studies and respects the natives, sets himself to learn their languages, "reads up" the history of the land, and is interested in its economic development. One feels that his future career should be in Equatorial Africa.

Colonel R. H. Vetch contributes a foreword, notable for a deserved tribute to the Baganda martyrs in the days of the foundation of Christianity in their country. Colonel Vetch falls into a singular error. He describes Speke and Grant as meeting with Samuel Baker on the western shores of Victoria Nyanza.

The illustrations are good and add considerably to the attractiveness of the volume.

F. R. C.

Peoples of the Congo Basin.

'Camp and Tramp in African Wilds.' By E. Torday. London: Seely, Service & Co., Ltd. 1913. *Illustrations and Map.* 16*s. net.*

Mr. Torday here gives us a summary of his early journeys (1900–1907) in the Congo regions; his later and greater expedition in the Kasai basin is already well known. The districts now described lie mainly in the Sankuru basin and between the Lualaba and Tanganyika. There are excellent descriptions of the lands visited, but the author is more concerned with peoples than places. He gives us a wonderfully vivid picture of the manner of life of the Bantu folk among whom he lived, notably that of the Bambala. The sympathy with and insight into the character of the African which Mr. Torday possesses in a marked degree will be communicated, at least in part, to every reader of these pages. The student of ethnology, who must gather his information here and there as he

follows the author's wanderings, might have preferred a treatise rather than a traveller's tale; the general reader will have no such longings. He will feel when he puts the book down—and it is hard so to do until the last page be reached—that he has gained a real acquaintance with Central Africa; that he knows its rivers and forests, its wild game, its insect terrors, its trying climate, and, above all, its primitive peoples. And he may be assured that in Mr. Torday he has had a competent guide. One or two points are in doubt. When, for instance, the author speaks of the spread of cannibalism, does he mean that it is spreading now (1913), or was spreading up to the period, ending in 1907, with which his book deals.

A short collection of native stories or nature lore is given. It is of distinct value as a help to understanding the workings of the African's mind. Nearly all the stories would make excellent tales for an English nursery. Numerous fine photographs illustrative of native customs add to the attractiveness of a most entertaining and informative book. F. R. C.

AMERICA.

'British Columbia in the Making.' By J. B. Thornhill. (London: Constable, 1913. Pp. xiii., 175. *Maps and Illustrations.* 5*s.*) This is a close account of the economic conditions and possibilities of British Columbia, prefaced by a perfunctory survey of the history, geography, and climate of the province, for which the author, in an introductory analysis of his chapters, rightly makes no great claims, though the reader may not agree with him that these subjects must necessarily deserve the qualification of dulness unless presented by a literary pen. The economic chapters which follow prove the author's minute knowledge of the territory, and his views as to the potentialities of untouched mineral regions and districts of other commercial possibilities, as well as those concerning desirable railway routes through this difficult country, and the situations of future ports on the Pacific seaboard, will be found to be of considerable prospective interest to economic geographers. The directness of his expression of his own ideas and opinions may or may not commend itself to the reader. Photographs are principally of economic interest or illustrate the sites of towns, and the black-and-white maps (excepting an obscure general map) are valuable; they show the head of the potentially important Portland canal, the geology of the province, the region traversed by the new Grand Trunk Pacific railway, and Vancouver island and the adjacent mainland.

'Down the Mackenzie and up the Yukon in 1906.' By E. Stewart. (London: Lane. 1913. Pp. 270. *Map and Illustrations.* 5*s. net.*) This was a journey of great interest. The title of the book sufficiently indicates its scope, for the crossing from the Mackenzie to the Yukon was made by the shortest possible route, from the head of the delta of the former river, down the Porcupine to the site of old Fort Yukon at the great bend of the latter. The journey had an especial economic value, and this is reflected on the map, which is taken from the author's official report, and indicates the character of the timber and species of trees observed all along the route, from Edmonton northward as far as the Porcupine river. It is hardly necessary to add that this region is one of great prospective economic interest.

'A Journey to Ohio in 1810.' By Margaret van Horn Dwight. (New Haven: Yale University Press; London: Oxford University Press. 1912. Pp. vi., 64. 5*s.* 6*d.*) This curious series of letters was worth resuscitation, especially in a case where such records must be scarce. The traveller met with many strange difficulties, and she has a marked power of describing incidents

and people. But she had no keen eye for topography; one letter is headed "A Dutchman's Inn—I don't know where."

'The Southland of North America.' By G. P. Putnam. (New York: Putnam's Sons. Pp. xiv., 425. *Map and Illustrations.* $2.50.) It may be questioned whether the title of this book, an ornate alias for Central America, is geographically sound, but there is no question that the book itself contains matter of more value than mere narrative of travel. Of the latter there is plenty, but there is also an endeavour to afford some idea, at first hand, of the economic conditions and possibilities of the Central American republics, and appendices provide brief statistical and other encyclopædic information, and a bibliography

'Modern Chile.' By W. H. Koebel. (London: Bell. 1913. Pp. x., 278. *Map and Illustrations.* 10*s.* 6*d.*) The writer of this book is a recognized authority on South American affairs, and in the present work he has been in close touch with authoritative sources of information. His book is descriptive and concerned with economic conditions in the main, rather than in any strict sense geographical. We find, however, some indication of the influence of the Andes, and of the climate, on Chile and the Chileans, and the writer views with interest the sites of some of the chief towns. The aboriginal tribes and the history of the country form the subjects of special chapters.

AUSTRALASIA AND PACIFIC ISLANDS.

'Australasia.' By A. J. Sargent. (London: Philip. 1913. Pp. viii., 152. *Maps and Illustrations.* 1*s.*) This volume is one of the series containing lectures prepared for the Visual Instruction Committee of the Colonial Office. There are eight lectures here, dealing with Australasia generally; with the various states of Australia (four lectures); with New Zealand (two), and with Fiji and the Western Pacific. The lectures are admirably lucid, and a number of illustrations are given in the volume, though these represent only a small proportion of the slides which are available to illustrate the lectures, and whose proper places are indicated by marginal reference numbers. The photographs, as reproduced, are good, but the maps, no doubt excellent as slides, are too small in detail as textual reproductions.

'The New World of the South.' By W. H. Fitchett. (London: Smith, Elder. 1913. Pp. xiv., 402. *Frontispiece.* 6*s.*) The subtitle of this book is "Australia in the Making," and the history of the island-continent is told in a decidedly attractive popular manner. The chapters deal with a series of specific incidents or persons rather than provide a complete historical narrative; although it is not to be supposed that the sense of historical continuity is missing. The old belief in a great southern continent is discussed, so far as it is associated with Australia, in the opening chapter; the discovery, early visits, Cook's work, the establishment of the British, the early land-exploration, and stories of outlawry and adventure, are among later topics. The author makes frequent reference to authorities, and, as concerns the style of his writing, it may be permissible to commend his marked power of imbuing the characters in his narrative with life and individuality.

'The English People Overseas.' Vol. V. 'Australasia, 1688-1911.' By A. Wyatt Tilby. (London: Constable. 1912. Pp. viii., 447. 6*s.*) This work, like those of the series which have preceded it, is cast on more formal lines than those of the book previously noticed; it supplies a complete historial conspectus of the various Australasian territories, carefully paragraphed with

marginal headings, and closely associated with references to divers works and to original documents. The volume is not indexed.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Rivers and Tidal Currents.

'Rivers and Estuaries, or Streams and Tides.' By W. H. Hunter, M.Inst.C.E. London: Longmans. 1913. Pp. 69. *Diagrams.* 2*s.* 6*d.*

Based on courses of lectures delivered in London and Manchester, this slight volume is intended for students of engineering as an introduction to the subject. The treatment, which is quite elementary, of course takes the point of view of the engineer in discussing the movements of river and tidal waters and their constructive and destructive work, but for this very reason it is suggestive to the geographer, and despite its small compass the book is worth reading even by those who have no concern with the regulation of river-flows and estuarial works. The author strongly advocates the construction of working models of estuaries as most useful in solving engineering problems relating to them, and reminds us of the favourable report on these presented by the British Association Committee appointed to report on that method of investigation some years ago. On one point Mr. Hunter's lectures may give rise to some controversy, and that is where he maintains, on the authority of the late Prof. James Thomson's experiments, that at the bend of a river the velocity is greatest at the inner or convex bank, though the erosion is greatest on the concave bank.

Northern Waters.

'The Sea West of Spitsbergen.' The Oceanographic observations of the Isachsen Spitsbergen Expedition in 1910. By B. Helland-Hansen and Fridtjof Nansen. Christiania: Jacob Dybwad. 1912. Pp. 89. *Six plates.*

This paper, published by the Fridtjof Nansen fund, is one of the publications of Captain Gunnar Isachsen's Spitsbergen expedition of 1909 and 1910, but the observations discussed were all taken in the summer of 1910. Of the two types of water-bottles employed the insulated ones proved the most satisfactory, since the reversing ones did not always close properly. The readings of the Nansen thermometer used with the insulated bottle were satisfactory, although generally too low. A similar but more pronounced error has been found in the use of this type of thermometer in Antarctic waters.

Special interest attaches to these observations in their bearing on the Spitsbergen Atlantic current. The authors conclude that the annual variations in salinity of this current are small; in this it resembles the Norwegian Atlantic current. This is opposed to the view held by Swedish oceanographers based on the Swedish observations of 1898 and 1908. The variations in temperature of the Spitsbergen Atlantic current agree with variations in the distribution of ice in the Spitsbergen and Barents seas, and these variations seem to agree, as far as our data go, with variations in the temperature of the Atlantic current about the Lofotens one year earlier, and in the Sognefjord section two years earlier.

Most interesting are the researches on the vertical circulation of water in Ice Fjord, and the explanation given of the facts discovered, which again is different from that put forward by Swedish oceanographers. But considering the fact that Ice Fjord is yet very badly sounded, and that even the probable absence of a sill at its mouth is not established, one wonders that Isachsen in addition to taking his temperatures and salinities did not take a few bottom soundings and so settle some of the features of this fjord.

While it would be superfluous to eulogize the work of these two accomplished

oceanographers, it is unfortunately necessary to call attention to one serious omission. The work of previous expeditions is referred to with the exception of that of the Prince of Monaco. No mention that we can find is made of his deep-sea work west of Spitsbergen, though the authors must be aware that these were published in 1905 (*Rés. des Campagnes scientifiques Fasc.*, 29) and comprise observations taken by Messrs. J. Y. Buchanan, W. S. Bruce, and J. Richard in 1898 and 1899. Why should these data be ignored, especially in a region where observations are extremely scanty? R. N. R. B.

GENERAL.

'The Statesman's Year-book for 1913.' Edited by Dr. J. Scott Keltie. (London: Macmillan. 1913. Pp. xcvi., 1452. *Maps and Diagrams.* 10*s.* 6*d.*) 'The Statesman's Year-book' celebrates its fiftieth issue, and so, without materially adding to its bulk, a number of special features have been incorporated to mark the occasion. Among these are some comparative statistics for 1862 and 1911 relating to the British Empire and principal foreign countries, and a valuable series of maps and diagrams, showing the continents comparatively, in 1862 and 1913, and the growth of displacement, etc., of battleships, and of gun-power, in the half-century. There is also a tabular retrospect of history for 1861–1911. Apart from these, the accustomed features of the work are preserved, including the usual maps of recent territorial changes, which for geographers are among the most useful features of the work.

'The Ancient History of the Near East.' By. H. R. Hall. (London: Methuen. 1913. Pp. xviii., 602. *Maps and Illustrations.* 15*s.*) This should prove a most valuable handbook, not only for the university student to whom it is especially addressed, but also to the general reader. It is no less excellently produced than written; on both counts it is easy, as such works go, to read, and Mr. Hall deserves the student's gratitude both for this and for affording him ample references in which he may pursue his studies, if desired, in greater detail. The black-and-white maps are generally satisfactory, and the photographs excellent. Geographical influences upon the history, though not insisted upon, are not lost to sight, as when the reclamation of the Nile valley is discussed, or the more fertile former condition of the Libyan coast is indicated.

THE MONTHLY RECORD.

EUROPE.

Progress of the Ordnance Survey.—The annual report of the Director-General of the Ordnance Survey to March 31, 1913, tells of good progress in the routine work of the department, and of several special undertakings of great interest. (1) "A ghost has been laid," to use the words of the report, by the completion of the test triangulation in Morayshire, and the inter-comparison of new results and old. Ever since the publication of General Ferrero's report on the principal triangulations (*Assoc. Géodésique Internat.*, Stuttgart: 1898. Annexe A. vii), the British triangulation has been considered under a cloud. The triangular error of this old work is naturally much larger than that of modern work—about four times as large. But in criticizing the British work, and in refusing to incorporate it with more modern continental triangulations, the critics have been apt to base their opinions on the size of the triangular error alone, and have not given weight to the fact that the British triangulation is a very complex, strong figure; much stronger in construction

than the usual chain of quadrilaterals. As the result of the re-investigation, Colonel Close concludes that the accuracy of the British triangulation is not only amply sufficient for all practical purposes, but also for all present scientific requirements. "The influence of a re-measurement of the British triangulation on the modern values of the size and shape of the Earth would be insignificant, and if funds sufficient for such re-measurement were to become available, they could be more profitably spent on other geodetic work, such as gravity survey." (2) A revision of the primary levelling has been undertaken, as a result of the Report of the Royal Commission on Coast Erosion, which contained a recommendation of the highest importance. "It would be an advantage if the Ordnance and Geological Surveys could take steps to ascertain from time to time whether, and if so to what extent, changes in the relative levels of land and sea are taking place." The old levelling of the kingdom is quite unsatisfactory, both in its reference to mean sea-level and in the permanence of its bench-marks. The "revision of the primary levelling" is thus in fact the first precise levelling of the country. A tidal station at Dunbar has been brought into operation; a second at Newlyn is nearly ready. Sites for "fundamental" bench-marks have been chosen on solid rock not likely to be disturbed by mining, and about 500 miles of levelling have been finished already. The instruments are of the new Zeiss pattern, with open graduations on the staff, and parallel plate micrometer. This precise levelling will furnish the data of reference for a solution of the question at some future time, whether the country is rising, or sinking, or tilting. It is greatly to be hoped that the recommendation of the Royal Commission will be carried out fully, "to ascertain from time to time . . . ," that is to say, to repeat the precise levelling at regular intervals. (3) Steps have been taken to reduce the number of initial meridians in use for projecting the cadastral maps, which will do much to mitigate the annoyance of change of projection and consequent misfit in the neighbourhood of county boundaries. (4) The production of a new edition of the 1-inch map, with notable improvements, has been referred to on p. 371 of the present volume of the *Journal*.

The Effect of Soil on the Distribution of Population, in the portion of the Baltic Lake ridge between the Oder and the Vistula, is discussed in an instructive paper by Else Wahnschaffe in the *Zeitschrift* of the Berlin Geographical Society, 1913, No. 5. As is well known, the slightly elevated belt of country which runs parallel with the southern shore of the Baltic is composed chiefly of glacial deposits (laid down by the old northern ice-sheet), which vary in character as we proceed southward from the coast-line. The main divisions from north to south are (1) the narrow coast-zone; (2) the northern flat ground-moraine; (3) the hummocky ground-moraine—an irregular complex of elevations and depressions bounded southward by the terminal moraine of the ice-sheet; (4) the "Sander," less continuous than the first three, formed of the sands, etc., left by the melting of the diluvial ice; (5) the southern flat ground-moraine. Of these No. 2, formed largely of the upper boulder-clay with much calcareous matter and loam, is the most markedly fertile. No. 3 also displays good loamy soil, especially in the hollows, but is generally more stony, and its irregular surface renders it less suitable for agriculture. The southern flat ground-moraine is still less fertile owing to the greater admixture of sand, while the "Sander" is naturally the least productive of all. In order to bring out the relative concentration of population in these four principal zones, the author traced their limits on the 1 : 100,000 map, and so found the parishes contained within each; then obtaining the areas and populations of the parishes from the

'Gemeinde-Lexikon' for Prussia. The whole area may be considered a centre of the German agricultural population, and the percentage of the whole falling within this class still remains a high one—mostly over 60 per cent. The settlements are accordingly, in the main, villages and private estates. If we group together the three moraine-zones, with their greater or less abundance of loamy soil, as the more fertile region, in contrast to the less fertile "Sander," we find that a corresponding difference is markedly noticeable in the density of population. Within the former section the density does not vary directly with the fertility, the hummocky zone being the best peopled of the three. This is not to be ascribed directly to any natural cause, but rather to the differing conditions of land ownership. Large estates are the rule over the whole lake-ridge, but while they preponderate most in the northern flat zone, they occupy a smaller relative area in the more broken zone, which is better suited to settlement in detail. Even in the "Sander" the density is relatively high, a fact which may be due to the smaller claims in the direction of comfort made by its Polish population. Within the several zones the writer investigates the distribution of density by taking out the population of the individual "circles" in each, the results being shown on a map. This brings out the fact that even in the region of loamy soil the density varies greatly in different parts. Four areas of unusual density owe this character to their favourable position in respect of industrial districts or navigable waterways, and the differences traced between the several geological zones taken generally are not always maintained in detail. In comparing the maps showing (1) the geological formations, (2) the distribution of density by "circles," the frequent coincidence of the dividing lines in the two cases is at first sight striking. But as the populations are worked out separately for the different formations, a change of density will naturally be often shown at the line of partition between them.

New Alpine Railway.—A new railway across the difficult mountain country north of Innsbruck, which had been in construction for some years, was opened for traffic in June last. It enters Bavaria at Mittenwald, and supplies a new means of communication from the south to Munich and Ulm, besides opening up a highland region of great interest. An account of the line appeared in the *Times* for September 16. The motive power is electricity.

ASIA.

Sir Aurel Stein's New Expedition.—Sir Aurel Stein, to whose new venture into the wilds of Central Asia we alluded to briefly last month, wrote from camp near Srinagar towards the end of June, giving an outline of his programme for the proposed journey. On the way to Kashgar (which he hoped to reach in September) he planned to proceed to the Chinese Pamirs by a route new to him, full of geographical and historical interest, and in part still unsurveyed. This would take him through the Indus Kohistan, and then across the ranges of the Hindu Kush south and north of Yasin. After a winter campaign in the desert, he hopes to extend his work to the easternmost Tian Shan, about Hami, as well as to the desert region lying east of this, and north of the Suchou-Liang-chou line. This has been hitherto known chiefly through the work of Russian explorers, chiefly Potanin, Obrucheff, the brothers Grum Grjimailo, and members of Kozloff's expedition of 1899–1901. The more strictly geographical work is well provided for by the provision on the part of the Survey of India of two Indian surveyors—one being Sir A. Stein's former trusted companion, Lal Singh, whose keenness seems in no way abated as a result of hardships undergone in his previous exploring campaigns. As on former expeditions, the

traveller promises to keep us informed from time to time of the progress of his undertaking.

Explorations in the Dibong and Dihong Valleys.—During the past summer the exploration work begun during the recent military expedition to the Abor country has been continued, partly with a view to settle the still unsolved problem of the "falls" of the Tsang-po river. The main party seems to have been at work in the valley of the Dibong, but, leaving this, Captains Bailey and Morshead crossed the watershed into the valley of the Dihong, hoping to push past the falls and join up with the work of Kinthup and other explorers from the Tibetan side. According to a communication to the *Pioneer* from a member of the Dibong exploring party, these two officers took the lightest equipment, and were entirely dependent on the country traversed for their supplies. The physical difficulties are certain to be great, for the explorers are making for the gorge where the Dihong or Tsang-po actually breaks through the great transverse range which is crowned by the great snow peak over 25,000 feet high, called Pemakoi during the Abor exhibition, and now to be known as Namcha Barwa. In a private letter dated June 5, Captain Bailey states that he had reached the confluence of the Chimdro with the Tsang-po, after crossing two bad snow passes. The confluence of the Nagong-chu was about four marches higher up, just below the impassable gorge in which the "falls" are supposed to be. Another exploring trip was made by Captains Trenchard and Pemberton, who succeeded in crossing the main ridge to the north-west, and actually struck the Tsang-po above Gyala, about six days above the supposed locality of the falls. Captain Trenchard got a barometer height for the river, which seemed to confirm the existence of an "enormous" drop in the river-bed. Supplies were, however, running short, and a speedy return to the main column was necessitated.

Baron von Oppenheim's Researches in Mesopotamia.—Some account of the work so far done by this traveller (cf. *Journal*, vol. **39**, p. 155) is given in *Petermanns Mitteilungen* for August and October of this year. Baron von Oppenheim has carried out extensive excavations at Tell Halaf, near the main source of the Khabur, on the site discovered by him in 1899. The remains of an important Hittite city brought to light here are particularly well preserved, which may be ascribed to the fact that the city was subsequently removed to Ras el Ain at the other source of the Khabur. The Baron made a month's journey through the country to the south and west in order to fix the limit of the Hittite kingdom. He followed routes for the most part not previously traversed by Europeans, and made some archæological finds referring both to the Hittite and to the Greco-Roman periods, besides discovering some hitherto unknown Arab cities. Though now devoid of inhabitants and almost waterless, this region must once have supported a large population. The traveller came into touch with raiding parties of the Shammar Arabs, as well as with the powerful Anezeh-Fedan. Another trip took him north-west to the Tektek range, which proved to be pierced by caves, which must have long been permanently inhabited. This region, too, was thickly peopled in the Hittite and subsequent periods. The excavations at Tell Halaf are said to have led to surprising results. The Baron is aided in this work by a number of experts, and has with him as medical officer and scientist Dr. Kohl, who took part in the early stages of Filchner's Antarctic expedition.

The Great Barrage on the Euphrates.—This great work, the most important item in the vast irrigation scheme set on foot by Sir William Willcocks and now being carried out by the firm of Sir John Jackson, was

reported early in October to be so near completion that its inauguration had been fixed for the end of that month. Some account of the progress of the work (with illustrations) was given in the supplement to *The Near East* for October 10, and reference may also be made to the *Journal*, vol. 40, p. 561, for details as to the Hindieh barrage and the associated regulator at Hilla. On completion of the work the water of the Euphrates will be turned into the new channel which has been dug by the side of the old one, while the latter will be permanently closed by a dam. A new channel has also been dug from the Hilla head-work to the bed of the existing Hilla branch, down which water will be carried for irrigation purposes. Another connected work not yet completed is the Habbanieh escape, by which the surplus flood water will be conveyed into a natural depression, thus preventing the risk of inundations of the cultivated lands below.

Persian Railway Survey.—Early in the present year the Persian Government entered into an agreement with a British Syndicate for the survey, to be completed within two years, of the line of the railway to be constructed from Muhammerah to Khoremabad. The work has been placed in the hands of Messrs. S. Pearson & Co., who have lately sent out a party of experts to complete the survey in the northern section, from Dizful to Khoremabad, that from Muhammerah to Dizful having been taken in hand earlier with a view to deciding on the course of the line up the Karun valley. The party is headed by Mr. Whitelaw, who left England at the end of September, and who expects to complete the survey, should no unforeseen difficulties occur, by May of next year.

Turco-Persian Boundary Commission.—In accordance with the Treaty of Erzerum in 1847 a commission of British and Russian officers set out to delimit a frontier between Turkey and Persia, extending from Mount Ararat on the north to the Persian gulf, a distance of some 700 miles. The outbreak of the Crimean war interfered with their labours, but eventually they decided to leave the actual delimitation of the frontier line within a certain zone which they indicated to the two Oriental Powers concerned, who have done nothing during the seventy years which have elapsed since then. Indeed, it may be questioned whether two Oriental Powers whose frontiers march with each other really care for hard and fast frontiers with rigid boundary marks in the occidental style, but would not rather prefer a certain resilience of frontier, so that they can push forward and seize coveted morsels of ground when the political difficulties of their neighbour may warrant the move. However this may be, the two Great Powers concerned have now decided to definitely delimit the Turco-Persian frontier throughout, and have appointed a commission of British and Russian officers for the purpose. On the British side the Chief Commissioner will be Mr. A. C. Wratislaw, C.B., C.M.G., of the Levant Consular Service, now Consul General for Crete, but who has recently held the post of Consul General for Tabriz; with Captain A. T. Wilson, C.M.G., who has held the post of Consul at Muhammerah and is now Assistant Resident in the Persian Gulf, as his assistant. M. Minorsky will be the Russian commissioner. The British survey party, which will undertake an accurate survey of the frontier zone from the Persian gulf to Ararat, will consist of Indian surveyors under the command of Major C. H. Ryder, D.S.O., R.E.—an officer whose exploration work in Tibet and on the north-east frontier of India is well known to the Society—assisted by Major H. M. Cowie, R.E. The Commissioners are to meet at Muhammerah on November 15, and are expected to commence work in the low-lying country during the winter, moving northwards into the hilly districts as the hot weather advances.

AFRICA.

The Benue Route to Lake Chad.—The route between the Benue and Shari, by way of the Mayo Kebi and Logone, was, it will be remembered, regarded with considerable favour in France as a result of Captain Lenfant's explorations. Previous to the surrender of the Mayo Kebi to Germany by the agreement of 1911, steps had been taken to improve this route to the Chad territory, a mission having been sent for the purpose under Captain Varigault, who gave an account of his work before the Paris Geographical Society on June 20 of this year (*La Géographie*, vol. **28**, p. 67). This officer's efforts met with considerable success, no obstacle to navigation having been met with between the ocean and Lere on the Mayo Kebi (which can be reached within a month from the coast), while the difficulties beyond were in great measure overcome by the making of a good road between Lere and the head of navigation on the side of the Logone. Near the latter river steps were taken to improve the navigation by the digging of a canal, which would have made the route, without doubt, the most rapid and economical means of access to Lake Chad. The above-mentioned cession has, however, it is feared, robbed the route of its practicable importance from the French point of view.

River Navigation in the Kamerun.—In connection with the railway to be constructed from Duala, the chief port and trade centre of the Kamerun, and Balmayo, on the upper course of the Nyong river, steps are being taken to test the navigability of that river with a view to its utilization for the extension of communication in the interior of the territory. Early this year an expedition started from Duala for the execution of a more detailed survey of the river than had previously been made, and a preliminary report by the leader on its early stages is printed in the *Deutsches Kolonialblatt* for July 15. Owing to the entire failure of the rains since November of last year the water was at an exceptionally low level, and this afforded a unique opportunity of testing the waterway, disclosing the presence of many bars and other obstacles which had not previously been observed. As compared with the state of things at the time of Fahrner's survey in 1911, the water stood throughout about half a metre (19–20 inches) lower, and its navigation by the expedition in canoes (one of which was fitted with a motor) seems to have been a matter of considerable difficulty. The depth frequently fell to as little as 1 foot, and for seven-tenths of the distance hardly reached 2 feet. When less than this the motor could not be used, and its employment was often limited to two or three hours in the day's voyage. The passage of many of the rapids could only be effected by exceedingly narrow channels. The work accomplished included careful levelling throughout the section examined, cross-sections, and determinations of speed and volume. The average fall was found to be about 1 in 40,000. Beyond the 180th kilometre the river emerges from the forest and park landscape, and flows through a grass-covered alluvial lowland, which is widely inundated at high water. The thorough amelioration of the waterway would be a costly undertaking, at least if it were to be made available throughout the year. For a considerable distance, however, the depth could be increased to 4 metres (13 feet) by means of barrages. The abundance of oil-palms would facilitate the employment of oil-driven motor-boats. After completing its work on the Nyong, the expedition will continue its operations in the direction of the Sanga and Congo.

A German Railway to Ruanda.—With the approaching completion of the line from the coast to Ujiji by way of Tabora, the question of providing a much-needed means of communication with the extreme north-west of the German

territory—the attractive highlands of Ruanda and Urundi—is coming to the front. According to an article by Max Moisel in the *Deutsche Kolonialzeitung* for June 21, the project has been definitely taken up in official quarters, the governor, Dr. Schnee, having last January undertaken a journey to Ruanda for the special study of the question. As a result, he has convinced himself that the best route for the proposed line is one running from Tabora, first north and then north-west, to the bend of the Kagera, this offering, he thinks, decided advantages over schemes for approaching Ruanda either from the side of the Victoria Nyanza or from Tanganyika. It is pointed out that a short branch line would also supply communication with the Victoria Nyanza and obviate the need of continuing the "Northern" railway to that lake through the inhospitable tracts between it and the coast.* Doubt has, however, been expressed whether the exact line approved by Dr. Schnee is the most suitable, an alternative one making for Ruanda by a more southerly course through Uha and Urundi being advocated by Pater van der Burgt of the White Fathers, whose knowledge of the countries to be traversed is hardly to be matched.

Proposed Jewish Colony in Angola.—In continuance of previous efforts on the part of the Jewish Territorial Organization ("Ito") to secure a suitable site for a colony, in which Jewish refugees might make themselves a new home among people of their own race, a movement has lately been set on foot to found such a colony in Southern Angola, which from the elevation of its plateau lands and the reputed fertility of its soil, has long been regarded as a future White Man's Country. The Portuguese Government has looked with some favour on such a scheme, as offering a means of developing the colony without risk of political complications, and a bill was lately submitted to the Portuguese Chambers by which facilities were offered for this purpose, but to individual settlers rather than to a comprehensive organization. This did not meet the views of the "Ito," which also felt the need of an actual investigation on the spot to test the suitability of the Benguela uplands for the proposed colony. Prof. J. W. Gregory, who had already done a similar piece of work for the organization by his visit to Cyrenaica in 1908 (*Journal*, vol. 34, p. 444), was therefore asked to inspect the country, which he did during a visit carried out between July and October of last year. His report has lately been issued, accompanied by other documents bearing on the question, the whole forming a valuable addition to our knowledge of the present position and natural resources of the region in question. Before setting out Prof. Gregory was impressed with the difficulty of reconciling former glowing accounts of the country and its resources with its present backward condition and sparse population, and was led to think that it might have been depopulated by sleeping sickness. He therefore secured the co-operation of Prof. C. J. Martin, F.R.S., who visited the country with him with a view to studying this question and the general conditions of the Benguelan plateau as regards healthiness. His conclusions are said to be thoroughly encouraging, and Prof. Gregory likewise takes a sanguine view of the suitability of parts of the country for the purpose of a colony, though allowing that taken as a whole it cannot be regarded as a rich one. His trip took him over the successive steps of the interior plateau, past the present head of the Benguela railway, and north to Bailundo and the iron ore district of

* Such a prolongation is, however, advocated in some quarters, and the well-known traveller, Dr. F. Jaeger, writes in the *Kolonialzeitung* of June 14 in support of a route by the Natron lake to Speke gulf. He thinks such a line needed to open up the lands round the Victoria lake and meet the competition of the British railway.

Ochilesa; the return being by a more easterly route through Bihe. In this way he was able to gain an idea of the main geographical and geological features of some 3000 square miles of country. He found that, instead of trending parallel with the coast, the geological formations run rather from east to west, and by striking north from the railhead he was able to extend his purview over a considerable variety of country. After a brief narrative of the expedition, his report presents a concise summary of results from the point of view of geography, geology, climate, agricultural possibilities, etc. Geologically, in addition to modern deposits derived from the waste of older rocks, the principal formations are Cretaceous (in the coast-lands), quartzites schists and gneiss, basic igneous rocks, felspar-porphyry, and granite; the last being the most widespread on the railway route. It gives rise to a light, easily worked soil, which may be rich in potash, but is very poor in lime. The soils of the sandstones are still poorer, most of the plant food having been lost in course of formation from the granite. The quartzites mostly give rise to a barren siliceous soil, but the gneisses yield soil of a better quality, being richer in lime and basic materials. The more basic igneous rocks give rise to the best soil, but are comparatively local. Generally speaking, none of the soils are of extreme fertility, but with suitable treatment with lime, etc., those from the Bailundo and Ochilesa districts would probably yield good results. The interior of the country has an ample rainfall, and serious droughts are likely to occur but rarely. The year is bisected sharply into a rainy and a dry season, but storage reservoirs could easily be formed with a view to irrigation in the latter. The present trade of the country is unsatisfactory, and though agricultural experiments (with coffee, cotton, wheat, etc.) have been made, it is impossible to say what products could be grown for profitable export. The chief crop is at present Indian corn, and cassava seems to do well. The poverty of the light soils in lime might be remedied by drawing upon the inexhaustible supplies of limestone along the coast.

AMERICA.

The Fishing Banks off the Atlantic Coast of the United States.—In the *Bulletin* of the American Geographical Society for June of this year, Mr. G. C. Curtis gives the results of observations during a recent trip in a fishing schooner to George bank and other of the outer fishing-grounds lying off the Gulf of Maine, which, he thinks, may throw light on the origin of the banks, besides having a considerable bearing on the subject of the conservation of the fish supply. From the armed sounding lead the nature of the finer material of the bottom could be seen, and rocks up to six and eight inches in diameter were also drawn up with the marine growths entangled in the fishermen's gear. George bank is a shoal in the open ocean, east-south-east of Cape Cod, bounded on the west and north by depths of 100 fathoms and over. A smaller bank—Brown bank—lies to the south of Cape Sable, Nova Scotia, and these elevated portions of the sea-bottom have long been the chief source of the fresh fish supply for the eastern United States. The material recently collected bears the stamp of glacial origin, and Mr. Curtis holds that the banks are the outer representatives of the terminal moraine deposits formed by the great ice-sheet of Pleistocene times, above-water portions of which stretch down the coast-line from Nantucket and Martha's vineyard to Long island, Staten island, and northern New Jersey. In comparison with the great oscillations of level which have been supposed to have taken place along the northern Atlantic coast in Pleistocene times, the amount of depression required to submerge a formerly

existing island on the site of George bank is insignificant. Mr. Curtis points out that the width of the continental platform increases rapidly northward as the southern unglaciated area is left, and that this greater width must in part at least be due to glacial deposits. The general configuration of the shoals as brought out by soundings seems also, he thinks, to confirm their glacial character. If this is the case, the search for new fishing grounds south of the glaciated area will be fruitless, and the need of careful conservation of the fish supply now being recklessly exploited becomes all the more urgent.

The Peru-Bolivia Boundary Survey.—Commander H. A. Edwards, who described his work for the survey of this boundary at the last meeting of last session, has reached Manaos on his way to resume operations, and while waiting for his Bolivian colleague, General Pando, is said to have determined the difference of longitude between Manaos and Porto Velho by wireless signals. This will make the party independent of its chronometers until the arrival at the scene of operations.

AUSTRALASIA AND PACIFIC OCEAN.

Traces of La Pérouse's Expedition.—The report comes from Paris that wreckage, believed to be the remains of La Pérouse's ship, the *Boussole*, has been found buried in sand on the island of Vanikoro, the scene of the shipwreck of the French navigator. It will be remembered that the search expedition of d'Entrecasteaux failed to throw light on the fate of the gallant explorer, and that it was reserved for the English Captain Dillon, some years later, to locate the disaster in Vanikoro, though even he left in obscurity the ultimate fate of the survivors who sailed from that island in a vessel built out of the remains of the ship. Besides collecting a number of relics of the expedition, Dillon was able to ascertain from the natives the position in which one of the ships was lost, on the reef on the south-west side of Vanikoro, the other being supposed to have sunk in deep water after striking the same reef. Portions of the first ship were said by the natives to have been driven on shore, and might thus in time become covered by sand.

POLAR REGIONS.

The Crocker Land Expedition.—In a "Statement to Contributors," issued at New York on August 15, particulars are given of the sailing of this expedition (cf. *Journal*, July number, p. 81), of the mishap to the *Diana*, and of the final start in the *Erik*, chartered at St. John's to take the place of the former. The *Diana* ran on the rocks off Barge point, Labrador, on July 17, owing to dense fog, but was got off successfully with merely the loss of the deck load of coal. Some time was spent in preparing the *Eric* for the voyage, but Mr. MacMillan and his party were able to leave St. John's once more on July 31, reaching Battle harbour, where the last supplies were taken on board, on August 3. On the 5th the expedition sailed for Cape York, which was expected to be the first stopping-place, and where the dog-teams and drivers were to be taken on board. Reports received by Mr. MacMillan indicated an exceptionally open season in the Far North, but, according to a despatch from him to the *New York Tribune* from Etah, printed in that paper on September 16, this expectation was not realized. Storm and fog caused some delay in the early part of the voyage, but Cape York was safely reached, and, though the best dog-drivers were away, the necessary complement was in the end obtained—some at North Star bay, some on Inglefield gulf, and one at Etah—all being accompanied by their wives and families. Game appeared to be scarce, and only a few walrus had been secured. On sailing from Etah for Flagler bay the ice in

Smith sound frustrated every effort to force a way through, and the hope of reaching Ellesmere Land had to be abandoned, headquarters being therefore established at Etah. Snow had already fallen when the despatch was written, and other signs of winter were manifest, so that the preparations for the return of the *Erik* were being hastened on. The date of sailing is not mentioned, but it is to be presumed that the report was brought by the ship to St. John's, whence it was cabled to New York on September 15. In addition to the staff previously mentioned, the party now includes Dr. Harrison J. Hunt, of Bangor, Maine, as surgeon and bacteriologist.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Some Dimensions of the Earth.—In the April number of *Petermanns Mitteilungen* for 1913 Dr. Henkel referred to the question of the greatest protuberance of the Earth's surface, noting that the point furthest removed from the centre was not the summit of Mount Everest, but rather that of Chimborazo, and specifying the distance in the two cases. In the July number Dr. A. von Böhm shows that Dr. Henkel's figures need some correction, pointing out also that attention had been called to the subject in 1888 by T. Epstein. Dr. von Böhm has calculated the distance from the centre in the case of thirty-one mountain summits, using Bessels' spheroid, which gives a value for the equatorial peaks only slightly smaller than is yielded by the newer spheroids of Helmert and Hayford. Of these peaks, twenty-five show a distance from the Earth's centre greater than that of Mount Everest, and only five are somewhat less. Chimborazo stands at the head of the list with 6383·69 kilometres, Kilimanjaro coming next with 6383·35. Mount Everest, on the other hand, can only show 6381·57 kilometres. While the longest *diameter* is no doubt that running from Chimborazo to a point in the lowlands of Sumatra, this is not the longest *straight line* that can be drawn, which will rather run from one of the Andean to one of the Sumatran volcanoes. Dr. von Böhm calculates the line from Cumbal to Gunong Korintji as 12,762·7 kilometres, or 1½ kilometres longer than the longest diameter. The shortest diameter of the solid mass of the Earth will perhaps be one starting from a point on the Antarctic ice-barrier in 84° 30′ S., 163° W., the sea in the antipodean region having a depth of some 3400 metres. The line through the solid Earth joining these points will measure only 12,709·2 kilometres, or 1½ kilometre less than the Earth's polar axis.

OBITUARY.

John Milne, D.Sc., F.R.S.

John Milne was affectionately known all over the world, many parts of which he had visited in person. He took a holiday trip to Iceland as a boy without asking his parents' leave; he spent two years in Newfoundland and Labrador; explored Mount Sinai and incidentally visited Egypt; and he travelled to Japan across Siberia in days when it involved as much hardship as many a modern polar expedition. The last eighteen years of his life, spent mostly in the retirement of the Isle of Wight, included as an incident the British Association visit to South Africa, and Milne seized the opportunity

to drive a golf-ball over the gorge of the Victoria falls.* He was hoping next year to put a girdle round the Earth, on the occasion of the projected meeting of the Association in Australia, probably revisiting his old home in Japan on the way back. But ever since he was greeted, on the night of his arrival in Tokyo, by a serious earthquake, he may be said to have subordinated his taste for travel to his passion for seismology; and thenceforward he took an atmosphere of earthquakes with him wherever he went, so that his presence in any company would almost inevitably turn the conversation to the topic of which he never tired, and in which he seldom failed to interest his hearers. In Japan, where earthquakes are the order of the day, this enthusiasm was scarcely surprising; but there must have been something remarkable about a man who could radiate earthquakes from his peaceful home in the Isle of Wight.

He was born at Liverpool on December 30, 1850, the only son of John Milne of Milnrow and Emma Twycross of Wokingham; educated at a school in Rochdale, at the Collegiate College, Liverpool, at King's College, London, and at the Royal School of Mines in Jermyn Street. One of his close contemporaries at King's College was Lord Milner, and years afterwards Milne and Milner met with mutual congratulations to receive honorary degrees at Oxford—D.SC. to the former and D.C.L. to the latter. Milne studied practical mining engineering in Cornwall and Lancashire, spent a short time at the Bergakademie Freiberg, and thence visited the principal mining districts in Central Europe. On his return to England he was selected by Mr. Cyrus Field, Sir James Anderson, and others to report on the mineral resources of Newfoundland and Labrador, where he spent two years. Thence he visited Funk island, and obtained a large collection of skeletons of the Great Auk. In 1874 he joined Dr. Beke's expedition to Sinai. In 1875 he was appointed Consulting Engineer to the newly formed Public Works Department of the Japanese Government, and leaving Hull on August 3, 1875, he made his way alone across Europe and Asia, reached the Great Wall of China on January 11, 1876, and Shanghai some months later. On one section of the route, for thirty-one days there were no roads, no houses, no bread, no vegetables, no washing, no change of dress day or night, plenty of snow, and from 40° to 50° of frost (abridged from the *Geological Magazine*, August, 1912).

On the first night he spent in Tokyo there was a considerable earthquake, and seismology attracted him from that moment. During the twenty years he spent in Japan his studies were conducted close to the seats of disturbance, and his attention was naturally arrested by the terrible loss of life often accompanying earthquakes, and by the possibilities of preventives, especially in the design and construction of buildings. The methods of building bridges and houses was entirely revolutionized at the instance of Milne and the other Europeans associated with him during these years in the endeavour to introduce Western ideas into Japan. "The piers of bridges are now made thicker at their bases and taper upwards, instead of being built with straight sides as in Europe, and brick factory chimneys have been replaced by structures of sheet iron. A severe earthquake now would not cause one-fourth of the damage which would have been inevitable a few years ago" (*loc. cit.*).

On his return to England in 1895, Milne wished to continue the studies which had gradually engrossed him. In England he would have no longer a plentiful supply of large earthquakes close at hand, but he hoped that by choosing his

* This event was cabled to England with a misprint which caused serious distress for a time: "Milne drowned Victoria falls." The word "drowned" should, of course, have been "drove."

residence near some geological "fault," he might be favoured with small tremors, which would open a new chapter in the history. After consultation with Prof. Judd, F.R.S., he selected Shide in the Isle of Wight as the place most likely to supply these minor thrills. The reason for selection is worth noting, as it shows how little it had so far entered into his plans that he might still study the large earthquakes from a distance. This possibility was opened up when von Rebeur Paschwitz, observing with a horizontal pendulum, noted a disturbance which was traced to a distant earthquake. Milne fastened on the clue at once, and quickly devised a simple instrument which, to his great delight, brought him news, even at Shide, of the great earthquakes he had left behind. The minor disturbances, which the neighbourhood of Shide might provide, were at once forgotten, and he concentrated all his attention on "world-shaking earthquakes," which could be observed over at least half the globe. With indomitable energy he secured the establishment of observing stations, furnished with his simple type of instrument and a simple programme of work, all over the world, chiefly in the British Empire. These stations reported regularly to him, and the records were systematized in his Reports and Circulars to the British Association, from which for many years came the only financial help Milne received in his great work. Other countries have now taken up the matter; seismology has princely endowments in Russia, and there is an International Seismological Association with headquarters at Strassburg and subsidies from many Governments. But the early pioneer work (as was cordially recognized at the last meeting of the Association) was done by John Milne in his quiet home in the Isle of Wight, with but little help or recognition save the loyal and skilful aid of his Japanese assistant Shinobu Hirota ("Snow"), who died a few months before him.

During his residence in Japan, Milne married Miss Tone Noritsune, who accompanied him to England, and survives him. He had sometimes had a few weeks' illness, but there was small warning of his sudden death on July 31 last. H. H. T.

Tempest Anderson, M.D., D.Sc.

By the death of Dr. Tempest Anderson, on August 26 ult., the Royal Geographical Society has lost one of its strongest and most loyal supporters. Dr. Anderson, who had been paying a long purposed visit to Java, Krakatao, and the Philippine islands, was seized on his way home by an attack of enteric fever which proved fatal to him. He died in the Red Sea near Suez, where he was buried.

Dr. Anderson had on various occasions previously had narrow escapes of losing his life when engaged in scientific travel. During a visit to Mexico for the Geological Congress in 1906, ptomaine poisoning caused him a severe illness; and when in company with Dr. Flett, on a mission from the Royal Society to Mount Pelée and the Soufrière (in 1902), he only just escaped destruction from a sudden eruption of the former mountain. It is a pathetic ending to his busy life that, when at last time and opportunity were granted him to visit Java and the Philippines, and after he had secured a large number of those artistic and instructive photographs which have made his name so well known to all who are interested in geography and geology, he should have been carried off by death when more than halfway on his voyage home.

Dr. Anderson, the son of a well-known York doctor, William C. Anderson, who belonged to an old Yorkshire family, was born at 17, Stonegate, York, in 1846. He was educated at the ancient school of St. Peter's, York, and at the

University of London. He was a student at University College, where he greatly distinguished himself, and of which he was elected a Fellow. He took the London M.D. degree in 1873, and in 1904 the University of Leeds conferred upon him the honorary degree of Doctor of Science. Dr. Anderson took a special interest in all that concerned the eye, and soon acquired in the North of England a great reputation as an oculist. He published various articles on this branch of surgery in the medical periodicals.

Dr. Anderson was a member of the Alpine Club. He was a great traveller, his special aim being the study of physical geography and geology, and especially of volcanoes and seismic phenomena. On these subjects he did much to increase our knowledge by his visits to the most notable volcanic districts of Europe, Mexico, Arizona, Guatemala, New Zealand, the South Sea islands, and the West Indies. His volume of 'Volcanic Studies,' published in 1902, was an important contribution founded upon practical knowledge. The report to the Royal Society, written in collaboration with Dr. Flett, on West Indian Eruptions 1902 to 1907, was another satisfactory piece of work. It is not too much to say that as a practical student and photographer of these subjects he had an international reputation.

Dr. Anderson took a keen interest in town-planning, and in everything connected with the welfare of his native city, York. He was president of the Yorkshire Philosophical Society, which was ever the object of his assiduous care, and to which he had just made the munificent gift of a new Lecture Theatre, which from the point of view of appearance and utility is probably not to be surpassed in the kingdom. He had served on the Councils of the Royal Geographical, the Geological, and the Linnean Societies, had been lecturer on volcanoes at the Royal Institution, and a Vice-President of the British Association. His personal character was such as to endear him to a large circle of friends, by whom his loss will be deeply felt.

Arminius Vambéry.

The distinguished Orientalist and traveller, Prof. Arminius Vambéry,* died suddenly at his residence at Budapest on September 15, in his eighty-second year. To an earlier generation the name of Vambéry was a household word in connection with Central Asian matters, and though less has naturally been heard of him of recent years, his interest in Eastern affairs was maintained to the end, and on the very day of his death an extract from a letter received from him by the *Times* was printed in that journal.

Born of Jewish parents at a small Hungarian town, the future scholar spent his childhood amid much poverty, and, after being apprenticed to a dressmaker at the age of twelve, for a time earned his living as tutor to the village innkeeper. Saving a little money, he was able to gratify his thirst for knowledge by entering the gymnasium at St. Georghen, where he devoted himself chiefly to the study of languages. The glamour of the East exercised a powerful attraction on him, and his desire to see its wonders and study its languages on the spot was at length gratified when, after four years spent in Constantinople, he set out, in 1862, on a journey to Persia, *en route* for the then almost closed region of the Central Asian Khanates. Travelling as he was in the disguise of a dervish, having joined a party of pilgrims returning from Mecca to Yarkand, the journey was beset by dangers

* Vambéry is the Magyarized form of the German name Bamberger, used by his father.

and hardships, and though the traveller came through safely, his life was more than once in imminent danger during the passage of the waterless deserts which lay on his route. After visiting Khiva, Bokhara, and Samarkand, he made his way back by way of Herat. Disappointed somewhat with his reception in Hungary, he came to England in 1864, and was cordially received both by geographers and statesmen. He gave an account of his travels before this Society at a meeting in June, at which the value of his work was spoken of in flattering terms by Sir Henry Rawlinson and other experts. The same year he published, in English, an account of his journey, which was translated into various European and Eastern languages. In 1865 the Society awarded M. Vambéry an "honorific donation" of 40 "as a token of our regard and of the high estimation in which we hold your adventurous journey into Central Asia."

From this time onward Vambéry cherished a consistent regard for things English, frequently re-visiting this country and always taking a distinctly Anglophil attitude in the political questions which arose between this country and Russia in Central Asia. His later writings were, in fact, largely taken up with such themes, though in 1883 he brought out a volume of a more personal nature, under the title 'Arminius Vambéry: his Life and Adventures, written by himself,' which passed through various editions. This was followed in 1904 by a two-volume work entitled 'The Story of my Struggles.' The traveller met with warm appreciation from the English Royal family, and during his visits to this country was the guest both of Queen Victoria and of King Edward (when Prince of Wales). He had been for many years Professor of Oriental Languages at the University of Budapest.

Captain Bertram Dickson.

A promising career has been cut short by the death of Captain Bertram Dickson, which took place at Loch Rosque Castle, Ross-shire, at the end of September, from the effects of an accident met with at the Milan aviation meeting just three years before. Captain Dickson was best known to the public as a bold and successful airman, being one of the first Englishmen to become an adept at the art, and first British officer to take up aviation in connection with Army work; but his earlier achievements were to a great extent in the field of geography. Born at Edinburgh and educated at the Royal Military Academy, Woolwich, he entered the Royal Artillery in 1894, becoming Captain in 1900. He served with distinction with the Royal Horse Artillery in the South African war, and soon afterwards went to British East Africa, where he did some survey work on the eastern borderlands of Kikuyu, contributing the results to the *Journal* (vol. 21, p. 36), in the form of a map and description of the country. He also took part as surveyor in Sir Thomas Holdich's mission in connection with the Argentine-Chilean Boundary dispute. Later, as Military Consul at Van, in Asiatic Turkey, he travelled among some of the least-known mountain districts of Kurdistan, and described his journeys before our Society in December, 1909 (*Journal*, vol. 35, p. 357). In 1909 he turned his attention to flying, and took many prizes, but in October, 1910, he met with the accident from the effects of which he never recovered, his aeroplane colliding with another in flight.

Sir Alfred Moloney, K.C.M.G.

Sir Cornelius Alfred Moloney, late Governor of Trinidad, who died in August near Florence, at the age of 65, was for some years a Fellow of this Society,

which he joined in 1879. Entering the army in 1867, he held various posts under the Colonial Office, principally in West Africa, between that year and 1891, besides commanding the troops on the Gold Coast in 1874. From 1887 to 1891 he was Governor and Commander-in-Chief of Lagos, and paid considerable attention to the geography and economic conditions of the colony and its Hinterland, on which he contributed papers to the British Association in 1889, and to our own *Proceedings* in 1890. In 1887 he had brought out a useful 'Sketch of the Forestry of West Africa,' the first attempt of the kind which had been made. From 1891 to his retirement in 1904 he was Governor, in turn, of British Honduras, the Windward islands, and Trinidad.

CORRESPONDENCE.

The Antarctic Continent.

Royal Societies Club,
St. James's Street, S.W.,
October 7, 1913.

On p. 362 of our Society's *Journal* for October, Sir John Murray says that "previous to 1874 it was considered extremely doubtful whether there were any large extent of continental land around the South Pole"; but after the *Challenger* expedition, "there was no longer room for doubt that an extensive continent really existed in the Antarctic."

You have in our library my work, 'The Elements,' published in the year 1866, containing a map which gives that continent to the full extent now known to exist; and the letterpress gives the evidence then available to justify the rough outline given on the map.

The arguments given in that work regarding the geological action by which the shape of the Earth has been determined have been justified by the combination of Arctic and Antarctic explorations which have been made since its publication.

WM. LEIGHTON JORDAN.

Challenger Lodge, Wardie, Edinburgh.

So far as I know, I have never seen 'The Elements,' so that I cannot express any opinion on what Mr. Jordan has written. There has been, of course, no intention of ignoring anything he may have written, by myself or my colleagues on the *Challenger*. Our point is, that until we dredged up the various kinds of continental rocks from the sea-bed far south, it was not known quite definitely that the land within the Antarctic circle was continental in character. This is not a reference to the extent of the land within the area, but to the character of the rocks.

JOHN MURRAY.

Early Voyage to the South Shetlands.

Historians of discovery have been laid under a debt to Mrs. Charles Bruce Marriott for her fascinating article in your October number. She would, however, confer an additional favour were she to mention the sources of her information. She informs us that the early charts of the South Shetlands are preserved in the Admiralty Library, but does not say where the agreement between Captain Shirreff and Captain Williams is to be found, nor where the even more interesting journal of Captain Robert Fildes is preserved. Captain

Fildes' journal well deserves to be published in full, and I hope that Mrs. Marriott may be able to get this done. Hitherto our knowledge of the discovery and charting of the South Shetlands (which by the way are not Antarctic lands, as they lie well on the temperate side of the circle) has been confined to the articles by Mr. J. Miers and Dr. Young in the *Edinburgh Philosophical Journal*, and to brief references in the voyages of Bellingshausen, Fanning, and Foster, with occasional scattered notes by sealers.

It is a small point, but historical accuracy requires us to recognize that the Russian expedition under Bellingshausen, which was planned solely for Antarctic exploration, has priority of Bransfield's cruise in the *Williams*, having been initiated early in 1819, and despatched from Cronstadt on July 15 in that year.

October 8, 1913. HUGH ROBERT MILL.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C.R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
Jber. = Jahresbericht.
k.k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Alps—Geomorphology. *Petermanns M.* 59 (1913): I. 281–288. **Hess.**

Die präglaziale Alpenoberfläche. Von Prof. Dr. Hans Hess. *Illustrations.*

Alps—Seismology. *Petermanns M.* 58 (1912): II. 313–316. **Tarnuzzer.**

Drei Dezennien der Erdbebenforschung in der Schweiz. Von Prof. Dr. Christian Tarnuzzer.

Europe—Climate. *Petermanns M.* 58 (1912): I. 266–267. **Schröder.**

Karte der Häufigkeit der Schwankungen um den Frostpunkt. Von Paul Schröder. *Map.*

France. **Riggs.**

France from sea to sea. By Arthur Stanley Riggs. New York, McBride, Nast & Co., 1913. Size 7½ × 5, pp. vi. and 316. *Illustrations. Price* $1.25 *net. Presented by the Author.*

France—Hydrology. **Service des Grandes Forces Hydrauliques.**
Ministère de l'Agriculture; Direction Générale des Eaux et Forêts. Service des Grandes Forces Hydrauliques (Région du Sud-Ouest). I.: Comptes Rendus des opérations effectuées. II.: Résultats obtenus pour les bassins de l'Adour et de la Garonne au 31 Décembre 1910. 2 vols. [Paris], 1912. Size 11 × 7, pp. (vol. 1) 255; (vol. 2) 510. *Maps, Diagrams, and Illustrations.*

Germany—Bavaria—Railways. *Petermanns M.* **59** (1913): I. 296-300. **Kimmel.**
Einige Beiträge zur Eisenbahngeographie Bayerns. Von Karl Kimmel. *Maps and Diagrams.*

Germany—Bavaria—Walchensee. *Petermanns M.* **58** (1912): II. 317-319. **Aufsess.**
Temperaturverhältnisse im Walchensee. Von Dr. Otto Frhr. v. u. z. Aufsess. *Diagram.*

Germany—East Prussia. *Petermanns M.* **58** (1912): II. 11-15. **Schütze.**
Der Goplosee. Von Hermann Schütze. *Map.*

Germany—Magnetism. **Haussmann.**
Petermanns M. **59** (1913): I. 11-15, 62-68, 119-121, 179-184.
Die magnetische Landesaufnahmen im Deutschen Reich und magnetische Uebersichtskarten von Deutschland für 1912. Von Prof. Karl Haussmann. *Maps and Diagrams.*

Germany—Pomerania—Coast. *Petermanns M.* **58** (1912): 203-204. **Lehmann.**
Die Ostseeinsel Ruden einst und jetzt. Von Dr. F. W. Paul Lehmann. *Maps.*

Germany—Schleswig-Holstein—Lakes. **Wegemann.**
Petermanns M. **58** (1912): I. 197.
Die Seen des Eidergebietes. Von Dr. G. Wegemann. *Maps.*

Iceland. *Petermanns M.* **58** (1912): II. 185-189. **Koch.**
Die dänische Expedition nach Königin-Luise-Land und quer durch das nordgrönländische Inlandeis 1912-13, unter Leitung von J. P. Koch. I.: Die Reise durch Island, 1912. *Map and Illustrations.*

Iceland—Guide. **Bruun.**
Turistruter paa Island. I.: Kysten rundt med Damper. II.: Gennem beboede Egne. Ved Daniel Bruun. (Foreningen de danske Atlanterhavsöer. Kort og Rejsebgöer, No. 2.) Copenhagen, Gyldendalske Boghandel, Nordish Forlag, 1912-1913. Size 9½ × 5, pp. xxiv. and 254. *Maps, Illustrations, and Sections. Presented by the Publishers.*

Iceland—Hecla. *Petermanns M.* **58** (1912): II. 189. **Pjeturss.**
Einige Bemerkungen über die Hekla und deren Umgebung. Von Dr. Helgi Pjeturss.

Italy—Naples. *Petermanns M.* **58** (1912): I. 131-135, 203-206, 258-264. **Kranz.**
Vulkanismus und Tektonik im Becken von Neapel. Von W. Kranz. *Maps and Illustrations.*

Russia. **Alexinsky.**
Modern Russia. By Gregor Alexinsky. London: T. Fisher Unwin, [1913]. Size 9 × 6, pp. 361. *Price 15s. net. Presented by the Publisher.*

Russia—Finland—Hydrography. **Sjöström.**
Fennia, B.S.G. Finlande **32** (1911-12): No. 9, 1-20.
Hydrografiska observationer gjorda somrarna 1902, 1903 och 1904 å Stor-Aisar fjärden, i mynningen af Esbo viken. Af W. Sjöström. *Illustrations.* [With German *résumé.*]
Sea-water temperatures, salinity, etc., on the coast west of Helsingfors.

Russia—Geology. *B.A. Imp. Sc. St. Petersbourg* (1913): 351-364. **Duparc.**
Sur la géologie et la pétrographie de la chaîne du Kalpak-Tokaïky-Kazansky (Pawdinskaya-Datcha). Par Louis Duparc avec la collaboration de M. M. A. Grosset et M. Gysin. [In Russian.]

Sweden—Norrland—Phytogeography. **Andersson and Birger.**
Den Norrländska flora: geografiska fordelning och invandringshistoria, med särskild hänsyn till dess Sydskandinaviska arter. Af Gunnar Andersson och Selim Birger. (Norrländskt Handbibliotek, 5.) Upsala, 1912. Size 10½ × 7½, pp. viii. and 416. *Maps and Illustrations.*

Sweden—Water-power. **Hydrografiska Byrån.**

Förteckning över Sveriges Vattenfall. Uitgiven av Kungl. Vattenfallsstyrelsen och Hydrografiska Byrån. 40: Indalsälven. Stockholm, 1913. Size 18 × 14, pp. vi. and 4. *Maps and Diagrams.*

Sweden—Wind. **Grenander.**

Ueber das Erscheinen der Seebrise an der Schwedischen Ostküste. Inaugural-Dissertation von Sven Grenander. Upsala, 1912. Size 9 × 6, pp. 97. *Map and Illustrations.*

Switzerland—Geology. **Frei.**

Beiträge zur Geologischen Karte der Schweiz. Neue Folge, XXXVII. Lieferung. Monographie des Schweizerischen Deckenschotters. Von Roman Frei. Bern: A. Francke, 1912. Size 12½ × 9, pp. 182 + xv. *Maps and Illustrations. Price* 15 *fr.*

Switzerland—Jura. *G.Z.* **80** (1912): 515–521. **Hettner.**

Aus dem Schweizer Jura. Eine morphologische Skizze. Von Alfred Hettner.

Turkey. *Petermanns M.* **59** (1913): I. 1–4. **Jorga.**

Auf- und Niedergang des türkischen Herrschaftsgebiets in Europa. Von Prof. Dr. Nikolaus Jorga. *Maps.*

Turkey—Bosporus. **Hoernes.**

Sitzb. K.A.W., Mathemat-Naturwissens. Klasse **120** (1911): 1087–1115.

Das Bosporusproblem. Von R. Hoernes. *Map and Illustrations.*

A former paper by Dr. Hoernes on the same subject was noticed in vol. **35**, p. 448.

ASIA.

Central Asia—Pamir. *Petermanns M.* **58** (1912): II. 190–193, 261–265. **Schultz.**

Bericht über den bisherigen Verlauf meiner Pamirexpedition 1911–12. Von Alfred v. Schultz. *Map, Sections, and Illustrations.*

China. **Thomson.**

China Revolutionized. By John Stuart Thomson. London: T. Werner Laurie, Ltd., [1913]. Size 9 × 6, pp. 590. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.*

China—Missions. **Cochrane.**

Survey of the missionary occupation of China. By Thos. Cochrane. Shanghai, The Christian Literature Society for China, 1913. Size 7½ × 5, pp. 372. [A folio atlas accompanies this volume.] *Presented by Dr. Ethel Trebe.*

China—Shantung. *Petermanns M.* **58** (1912): I. 245–247, 303–304. **Anz.**

Das Hinterland von Tschifu und die geplante Eisenbahn Tschifu-Weihsien. Von Walter Anz. *Map and Illustrations.*

India—Drugs. **Orta and Markham.**

Colloquies on the simples and drugs of India. By Garcia da Orta. New edition (Lisbon, 1895). Edited and annotated by the Conde de Ficalho. Translated with an introduction and index by Sir Clements Markham. London: Henry Sotheran & Co., 1913. Size 9 × 7, pp. xxii. and 510. *Illustrations. Presented by Sir Clements Markham.*

Indo-China, French. *Petermanns M.* **58** (1912): II. 266–270, 319–323. **Maitre.**

Das südliche Indochina. Nach eigenen Forschungen von Henri Maître. *Map and Illustrations.*

Japan—Bibliography. **Cordier.**

Publications de l'École des Langues Orientales Vivantes. Bibliotheca Japonica. Dictionnaire bibliographique des ouvrages relatifs à l'Empire Japonais, rangés par ordre chronologique jusqu'à 1870, suivi d'un appendice renfermant la liste alphabétique des principaux ouvrages parus de 1870 à 1912. Par Henri Cordier. Paris: Ernst Leroux, 1912. Size 11 × 7, pp. xii. and 762. *Presented by l'École des Langues Orientales Vivantes.*

Japan—Volcanoes. *Petermanns M.* **58** (1912): I. 309–312. **Friedlaender.**

Ueber den Usu in Hokkaido und über einige andere Vulkane mit Quellkuppenbildung. Von Immanuel Friedlaender. *Maps and Illustrations.*

Russia—Eastern Siberia. **Unterberger.**
Zap. Imp. Russ. G.S., Statist. Sect. **13** (1912): pp. xiv., 428, and 53.
The Preamur region, 1906–1910. By P. F. Unterberger. *Maps, Diagrams, and Illustrations.* [In Russian.]

AFRICA.

Abyssinia—Language. **Foot.**
A Galla-English, English-Galla Dictionary. Collected and compiled by E. C. Foot. Published with the aid and approval of His Majesty's Foreign Office. Cambridge: University Press, 1913. Size 9 × 6, pp. vii. and 118. *Presented by the Cambridge University Press.*

British East Africa. **Crawford.**
By the Equator's Snowy Peak. A record of medical missionary work and travel in British East Africa. By E. May Crawford, with a preface by the Right Rev. the Bishop of Mombasa, and a foreword by Eugene Stock. London: Church Missionary Society, 1913. Size 9 × 6, pp. 176. *Illustrations. Price 2s. 6d. net. Presented by the Publishers.*

East Africa—Pemba. **Craster.**
Pemba, the spice island of Zanzibar. By Captain J. E. E. Craster. London: T. Fisher Unwin, [1913]. Size 9 × 6, pp. 358. *Sketch-map and Illustrations. Price 12s. 6d. net. Presented by the Publishers.*

Egypt—Libyan desert. *Petermanns M.* **59** (1913): I. 190–191. **Leuchs.**
Eine Reise in der südlichen Libyschen Wuste; Gebel Garra, Oase Kurkur, Gebel Borga. Von Dr. Kurt Leuchs. *Map and Illustrations.*

German East Africa. *Petermanns M.* **58** (1912): II. 324–327 **Van der Burgt.**
Land und Leute von Nordurundi, Deutsch-Ostafrika. Von Jean M. M. van der Burgt. *Map.*

German East Africa.—Kilimanjaro. *Petermanns M.* **58** (1912): II. 336–337. **Klute.**
Vorläufiger Bericht über eine Forschungsreise am Kilimandscharo von Eduard Oehler und Dr. Fritz Klute im Sommer 1912. Von Dr. Fritz Klute.
See note in vol. **40**, p. 563.

German East Africa.—Rufiji. *Petermanns M.* **58** (1912): II. 198–201. **Pfeil.**
Die Entstehungsgeschichte des unteren Rufiji. Von Joachim Graf Pfeil. *Map.*

Morocco. *Petermanns M.* **58** (1912): I. 270–271. **Zietz.**
Höhenschichtenkarte des Atlasvorlandes von Marokko. Von Dr. Rud. Zietz. *Map.*

Morocco—Cartography. **Schnell.**
Petermanns M. **58** (1912): II. 75–77, 137–142, 194–197.
Zur Kartographie Nordmarokkos. Von Prof. V. Schnell. *Maps.*

Morocco—Communications. *Petermanns M.* **58** (1912): II. 55–58. **Hübner.**
Die Verbindung vom Wadi Muluya zum Um er Rbia in Marokko. Von Oberstleut. Hübner. *Sketch-maps.*

Morocco—European spheres. *Petermanns M.* **59** (1913): 21–22. **Wichmann.**
Der Abschluss des Marokkohandels. Von Hugo Wichmann. *Map.*

Sahara. *La G., B.S.G. Paris* **27** (1913): 241–261. **Schmitt.**
Le Sahara occidental. Régions au nord et au nord-ouest de l'Adrar mauritanien. Par Lieut. G. Schmitt. *Map.*
See note in the July number, p. 77.

Sahara—Positions. *La G., B.S.G. Paris* **27** (1913): 116–125. **Cortier.**
Liste des positions géographiques déterminées dans le Sahara par la Mission Cortier (1908–1910). Par M. Cortier.

Sahara—Railway Survey. *La G. B.S.G., Paris* **27** (1913): 109–115. **Niéger.**
La mission d'étude du Transafricain. Par Capitaine J. Niéger. *Sketch-maps and Illustrations.*
Cf. note in vol. **41**, p. 386.

South Africa. **Scully.**
Further reminiscences of a South African Pioneer. By William Charles Scully. London. T. Fisher Unwin, [1913]. Size 9 × 6, pp. 384. *Illustrations. Price 10s. 6d. net. Presented by the Publisher.*

South Africa—Kalahari. *Petermanns M.* **58** (1912): II. 15–20. **Pöch.**
Ethnographische und geographische Ergebnisse meiner Kalaharireisen. Von Dr. Rudolf Pöch. *Map and Illustrations.*

Spanish Guinea—Annobon. *Petermanns M.* **59** (1913): I. 131–133. **Schultze.**
Die Insel Annobon im Golf von Guinea. Von Dr. Arnold Schultze. *Map and Illustrations.*

Togo—Meteorology. *M. Deutschen Schutzgebieten* **25** (1912): 187–213. **Heidke.**
Meteorologische Beobachtungen aus Togo. Teil iii. Zusammenstellung der Monats- und Jahresmittel aus dem Jahre 1911 an elf Beobachtungsstationen. Von Dr. P. Heidke.

Transvaal—Geology. *T. Geol. S. South Africa* **15**, 1912 (1913): 93–99. **Krause.**
A contribution to the structural geology of the East Rand. By Herbert L. Krause. *Sketch-map and Sections.*

Tripoli. **McClure.**
Italy in North Africa. An account of the Tripoli enterprise. By W. K. McClure. London: Constable & Co., Ltd., 1913. Size 9½ × 6. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

West Africa—Harmattan. *M. Deuts. Schutzgeb.* **26** (1913): 9–12. **Seefried.**
Untersuchungen über die Natur der Harmattantrübe. [Von Hauptmann Frhr. v. Seefried.]
See note in the Monthly Record, September, p. 297.

West Africa—Railways. *J.R. United Service I.* **57** (1913): 167–194. **Mance.**
The railway systems of West Africa. By Captain H. O. Mance. *Sketch-maps.*

West Africa—Storms. *La G., B.S.G. Paris* **27** (1913): 208–210. **Schwartz.**
La formation des orages dans les régions montagneuses de l'Afrique occidentale. Par — Schwartz.

NORTH AMERICA.

Canada—Ontario—Toronto. **Faull.**
The natural history of the Toronto region, Ontario, Canada. Edited by Dr. J. H. Faull. Toronto: The Canadian Institute (*per* William Briggs), 1913. Size 8 × 5; pp. 419. *Maps and Illustrations. Price* $2. *Presented by the Publisher.*

Canada and Newfoundland. **Sargent.**
Visual Instruction Committee Handbooks, No. 4. Canada and Newfoundland. Seven lectures prepared for the Visual Instruction Committee of the Colonial Office by A. J. Sargent. London: George Philip & Son, 1913. Size 7½ × 5; pp. 118. *Sketch-maps and Illustrations. Price* 8*d. Presented by the Publishers.*

United States—North Carolina. **Morley.**
The Carolina Mountains. By Margaret W. Morley. London: Constable & Co., 1913. Size 9 × 6, pp. viii. and 398. *Illustrations. Presented by the Publishers.*

CENTRAL AND SOUTH AMERICA.

Brazil—Amazon. *Petermanns M.* **58** (1912): I. 209–213. **Snethlage and Mayr.**
Die Routenaufnahme von Dr. E. Snethlage vom Xingu zum Tapajoz. Von Dr. Max Mayr. *Map.*

Bolivia—Andes. *Petermanns M.* **59** (1913): I. 192–195, 247–250, 304–308. **Herzog.**
Die bolivischen Kordilleren. Von Dr. Theodor Herzog. *Map and Illustrations.*

Central and South America. **Enock.**
The Republics of Central and South America. Their resources, industries, sociology and future. By C. Reginald Enock. London: J. M. Dent & Sons, 1913. Size 8½ × 5½, pp. 544. *Maps and Illustrations. Price* 10*s.* 6*d. net. Presented by the Publishers.*

Chile—Surveys. *Petermanns M.* **58** (1912): I. 312–316. **Fuenzalida and Polakowsky.**
Zur geographischen und geologischen Landesaufnahme der Republik Chile. Von Jose del C. Fuenzalida und Dr. H. Polakowsky. *Map.*

Nicaragua. *Petermanns M.* **59** (1913): I. 310–311. **Sapper.**
Entwurf von Höhenschichtlinien der mittleren Vulkanregion Nikaraguas. Von Prof. Dr. Karl Sapper. *Maps.*

AUSTRALASIA AND PACIFIC ISLANDS.

Australia—Travel. **Harris.**

Outback in Australia, or three Australian overlanders. Being an account of the longest Overlanding journey ever attempted in Australia with a single horse, and including chapters on various phases of Outback Life. By Walter Kilroy Harris. Letchworth: Garden City Press, Ltd., 1913. Size 9 × 6, pp. x. and 224. *Portrait and Illustrations. Price 5s. net. Presented by the Author.*

New Zealand—Historical. **McNab.**

The old whaling days: a history of Southern New Zealand from 1830 to 1840. By Robert McNab. Christchurch, etc.: Whitcombe & Tombs, 1913. Size 9 × 5½, pp. xv. and 508. *Presented by the Author.*

POLAR REGIONS.

Antarctic—Climate. *Petermanns M.* **58** (1912): II. 22–24. **Mecking.**

Der Witterungscharakter an der *Gauss*-Station und die Fragen der südhemisphärischen Zirkulation. Von Dr. L. Mecking.

Spitsbergen—Norwegian Expedition. **Staxrud and Hoel.**

La G., B.S.G. Paris **27** (1913): 99–108.

Résultats généraux de l'expédition norvégienne au Spitsberg (1911–1912) Par Arve Staxrud and Adolf Hoel. *Sketch-maps and Illustrations.*

See note in vol. 41, p. 592.

MATHEMATICAL GEOGRAPHY.

Cartography. **Morrow.**

Contours and maps explained and illustrated. By Frederick Morrow. London: Meiklejohn & Son, 1913. Size 7½ × 5, pp. viii. and 116. *Sketch-maps, Diagrams, and Illustrations. Price 1s. 6d. net. Presented by the Publishers.*

Longitude by telegraphy. *Petermanns M.* **59** (1913): II. 175–176. **Hammer.**

Der internationale drahtlos-elektrische Weltdienst und seine Bedeutung für die Geographie. Von Prof. Dr. Ernst Hammer.

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Earth history. *Petermanns M.* **59** (1913): I. 121–123. **Klöcking and Arldt.**

Simroths biologische Entwicklungsgesetze im Lichte der A. Wegenerschen Hypothese von der Horizontalverschiebung der Kontinentalschollen. Von Johannes Klöcking und Dr. Theodor Arldt.

Geomorphology—Coasts. **Matthews.**

Coast erosion and protection. By Ernest R. Matthews. London: C. Griffin & Co., 1913. Size 9 × 6, pp. xiv. and 147. *Illustrations, Sketch-maps and Diagrams. Price 10s. 6d. net. Presented by the Publishers.*

Geomorphology—Continents. *Petermanns M.* **58** (1912): I. 219–253. **Seyferth.**

Die Gliederung der Erdteile. Von Dr. P. Seyferth. *Maps.*

Geomorphology—Continents. **Wegener.**

Petermanns M. **58** (1912): I. 185–195, 253–256, 305–309.

Die Entstehung der Kontinente. Von Dr. Alfred Wegener. *Diagrams.*

Geomorphology—Loess. *Petermanns M.* **59** (1913): I. 16–18, 67–74, 126–130. **Merzbacher.**

Die Frage de Entstehung des Lösses. Von Prof. Dr. Gottfried Merzbacher. *Sections. Also separate copy.*

See note in the October number, p. 403.

Geomorphology—Valleys. *Petermanns M.* **58** (1912): II. 328–329. **Distel.**

Schliffkehle und Taltrog. Eine Erwiderung von Dr. L. Distel. *Section.*

Limnology. *Petermanns M.* **58** (1912): I. 257–258. **Endrös.**

Die Vibrationen der Seen. Von Prof. Dr. A. Endrös. *Diagrams.*

Oceanography—Tides. *M. k.k. Militär-G.I.* **31** (1911): 103–151. **Gregor.**

Flutmesserangaben in Ragusa. Mitgeteilt von Julius Gregor.

Phytogeography. **MacDougal.**

Department of Botanical Research of the Carnegie Institution of Washington. Annual Report of the Director, D. T. MacDougal, 1912. (Reprinted from Year

Book No. 11, 1912.) [Washington, 1912.] Size 10 × 7, pp. 49–76. *Illustrations.*

Includes reports on research in the Salton lake region, the Egyptian deserts, etc.

River-erosion. *Rept. Australasian Ass.* **13**, 1911 (1912): 146–147. **Steel.**

On the transport of mud by a river in flood. By Thos. Steel.

Seismology. *Beiträge z. Geophysik* **12** (1912): 9–15. **Davison.**

The prevision of earthquakes. By Charles Davison. *Sketch-maps.*

Seismology. *Beiträge z. Geophysik* **12** (1913): 363–483. **Pilgrim.**

Die Berechnung der Laufzeiten eines Erdstosses mit Berücksichtigung der Herdtiefen, gestützt auf neuere Beobachtungen. Von Prof. Dr. Ludwig Pilgrim. *Illustrations.*

Seismology. *Beiträge z. Geophysik* **12** (1912): 1–12. **Schmidt.**

Zur Herdtiefe des süddeutschen Erdbebens vom 16. November 1911. Von A. Schmidt. *Diagrams.*

Soil temperatures. *Met. Z.* **29** (1912): 570–578. **Vujević.**

Die Temperaturen verschiedenartiger Bodenoberflächen. Von P. Vujević. *Illustration.*

Terrestrial Magnetism. *Petermanns M.* **58** (1912): II. 20–21. **Fritsche.**

Die erdmagnetische Deklination um das Jahr 1500. Von Dr. H. Fritsche. *Map.*

Valleys. *G.Z.* **90** (1913): 153–161. **Hettner.**

Die Entstehung des Talnetzes. Von Alfred Heitner.

Zoogeography—Eel. **Schmidt.**

Danish researches in the Atlantic and Mediterranean on the life-history of the freshwater-eel (*Anguilla vulgaris*, Turt.). With notes on either species. By Dr. Johs. Schmidt. (Extract from the *Internationale Revue der gesamten Hydrobiologie und Hydrographie*, 1912.) Leipzig, 1912. Size 9½ × 6½, pp. 317–342. *Maps and Illustrations.*

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Ethnology—Culture. *Petermanns M.* **59** (1913): I. 4–7, 135. **Haberlandt.**

Die Verbreitung des Erdofens. Prof. Dr. Michael Haberlandt.

Ethnology—Races. *Petermanns M.* **59** (1913): I. 169–174. **Fritsch.**

Rückblicke auf die Ergebnisse der Rassenmischung in verschiedenen Ländern. Von Prof. Dr. Gustav Fritsch.

Historical—Magellan's Voyage. *Petermanns M.* **58** (1912): II. 335. **Koelliker.**

Kurs der Magellanischen Flotte durch die indische Inselwelt auf der ersten Erdumseglung 1519–22. Von Oskar Koelliker. *Maps (facsimile and original).*

Nature and Man. *Petermanns M.* **58** (1912): II. 309–311. **Strunz.**

Naturgefühl und Landschaftssinn. Von Dr. Franz Strunz.

BIOGRAPHY.

Rhodes. **Sueur.**

Cecil Rhodes. The man and his work. By one of his private and confidential secretaries, Gordon le Sueur. London: John Murray, 1913. Size 9 × 6, pp. xii. and 346. *Portrait and Illustrations. Price* 12*s. net. Presented by the Publisher.*

GENERAL.

Education—Text-book. **Heaton.**

A comparative geography of the six continents. By Ellis W. Heaton. London: Ralph, Holland & Co., [1913]. Size 7½ × 5, pp. 220. *Sketch-maps, Diagrams, and Illustrations. Price* 1*s.* 9*d. net. Presented by the Publishers.*

Education—Text-books. **Finch.**

Questions and exercises in geography. (Based on Heaton's 'Scientific Geographies.') By Robert J. Finch. London: Ralph, Holland & Co., [1911]. Size 7½ × 5, pp. xvi. and [320]. *Sketch-maps and Sections. Price* 2*s.* 6*d. net. Presented by the Publishers.*

Geographical Congress. *Petermanns M.* 59 (1913): I. 227–229, 288–295. **Braun.**

Der 10. Internationale Geographenkongress in Rom, 27. März bis 3. April 1913. Von Prof. Dr. Gustav Braun. *Illustration.*

Puts forward suggestions for reform of procedure, etc.

Geography—Text-book. **Andrews.**

A text-book of geography. By A. W. Andrews. London: Edward Arnold, 1913. Size 7½ × 5, pp. xii. and 656. *Sketch-maps and Sections. Price 5s. Presented by the Publisher.*

Text-books. **Franklin and Griffiths.**

The Atlas geographies; preparatory. By Thomas Franklin and E. D. Griffiths. British Isles and Europe. Edinburgh, etc.: W. & A. K. Johnston, [1913]. Size 10 × 7, pp. 64. *Maps. Price (2 parts) 6d. each. Presented by the Publishers.*

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Berkshire, 15 N.E., 21 N.E., 23 N.E., 23 S.E., 26 N.W., 27 N.E., 28 N.W., 35 N.W. **Cheshire,** (6 N.W. and 6 N.E.), 6 S.W., 22 N.E., 22 S.W. **Flintshire,** 10 N.W. **Lancashire,** 42 N.E., 44 S.W., 54 N.E., 55 S.W., 61 N.W., 61 S.W., 61 S.E., 64 N.E. **Oxfordshire,** 55 N.W. **Sussex,** 21 N.E., 21 S.W., 22 S.W., 22 S.E., 60 S.W., 60 S.E., 61 S.E., 63 S.E. **Yorkshire,** 91 S.W., 92 N.W., 107 S.W., 124 N.W., 126 N.W.

1 : 2500 scale.

Revised, with houses stippled, and with areas. *Price* 3*s. each.*

Lancashire, 11–2, 12–11, 12, 16, 16–1, 2, 4, 17–1, 18–1, 7, 8, 12, 15, 16, 19–4, 7, 9, 11, 13, 14, 15, 16, 20–2, 24–3, 25–3, 4, 16, 26–1, 31–4. Sheets 10–15, 18 (3 and 4), 6, 19–3, 5, 10, 26–2. *Price* 1*s.* 6*d. each.* **Warwickshire,** sheet 22–13. **Yorkshire,** 54–5, 6, 7, 9, 11, 16, 55–8, 12, 56–10, 14.

(*Messrs. E. Stanford, Ltd., London Agents.*)

British Isles—England and Wales. **Railway Clearing House.**

Official Railway Map of England and Wales. Scale 1 : 475,200 or 1 inch to 7·5 stat. miles. 2 sheets. Prepared and published at the Railway Clearing House. London, 1913. *Price* 12*s.* 6*d.*

A new edition of an outline map showing the railways of the various companies in different colours.

France. **Service Géographique de l'Armée, Paris.**

Carte de France. Scale 1 : 50,000 or 1·3 inch to 1 stat. mile. Sheets: xxxiv.–46, Hyères; xxxiv.–47, Ile de Porquerolles; xxxv.–46, Cap Lardier; xxxvi.–16, Ciresy-sur-Vezouse; xxxvi.–17, St. Dié. Paris: Service Géographique de l'Armée, 1913. *Price* 1.60 *Fr. each sheet.*

Continuation of the new survey map of France, of which a notice appeared in the *Geographical Journal* for February, 1907.

Holland. **Beekman.**

Geschiedkundige Atlas van Nederland. Uitgegeven door de Commissie voor den Geschiedkundigen Atlas van Nederland en Geteenkende door het lid der Commissie A. A. Beekman. De Republik in 1795. Sheets 13, 14, 17, 18. The Hague: M. Nijhoff, [1913].

The first part of this atlas appeared in 1912, and was noticed in the April *Geographical Journal* for that year. The present part contains sheets 13, 14, 17, and 18 of the map of the Republic in 1795, of which twelve sheets have already been published.

Sweden. **Generalstab, Stockholm.**

Generalstabens Karta öfver Sverige. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Sheets: 62, Björna N.O., S.-v. (11 by 14½ inches); 96, Lecksand (17½ by 23½ inches). Scale 1 : 200,000 or 1 inch to 3·15 stat. miles. Sheet 66, Strom (11 × 14½ inches). Stockholm: Generalstabens Litografiska Anstalt, 1912–13. *Presented by the Swedish Government.*

New sheets showing relief by vertical hachures in neutral tint, and water blue.

ASIA.

Asia Minor. **Egyptian Survey Dept.**

Map of Dalaman Chai. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Compiled from (1) Admiralty chart, revised in 1872; (2) Young's prismatic compass survey, 1909–1910; (3) Abd el Magid Yusri, 1909. Cairo: Survey Department, 1911. *Presented by Captain H. G. Lyons,* D.SC., F.R.S.

The Dalaman Chai is a river in south-western Asia Minor, something like 100 miles in length, which flows into the Mediterranean opposite the island of Rhodes. This map shows the course of the river and its tributaries in black and blue, and the adjacent mountains in brown vertical hachures. Some heights (approximate) are given in feet, but there is nothing to say how these have been obtained; and as there is no projection, and no north point marked, it is impossible to orient the map with certainty.

China. **Polignac and Audemard.**

Cartes Itinéraires d'I Tch'ang à Yun nan Fou et Li Kiang par le Yang Tseu Kiang et la vallée du Kien Tch'ang. Voyage du Comte Ch. de Polignac. Levés du Capitaine de Frégate Audemard. 15 sheets. Paris: Augustin Challamel, 1913. *Presented by M. le Comte Charles de Polignac.*

A map in fifteen coloured sheets and index, folded in case, setting forth in detail the journey of Comte Ch. de Polignac from Ichang to Lichiang in the upper Yang-tse region, on scales varying from 1 : 60,000 to 1 : 850,000, with a supplementary sheet giving the journey from Shanghai to Ichang on a smaller scale (1 : 1,250,000).

The map has been constructed from the route surveys of Captain Audemard, who accompanied the expedition, and is clearly drawn and printed in colours. No information is given on the map as to the method of survey, or what points were determined by astronomical observation. Vertical sections of the various parts of the route are given, with heights, and there is an alphabetical index to place-names as a separate pamphlet. The names in Chinese character are added at the side of the list.

Hong Kong. **Geographical Section, General Staff.**

Hong Kong and part of the leased territory. Scale 1 : 25,344 or 2·5 inches to 1 stat. mile. Provisional issue. 2 sheets. Geographical Section, General Staff, War Office, 1913. London agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T.

Fisher Unwin. *Price 2s. each sheet. Presented by the Director of Military Operations.*

A good useful map, including the island of Hong Kong and country for about 11 miles to the north. Relief is shown by brown contours at intervals of 50 feet, with every 500 feet accentuated. The contours on the mainland are taken from a cadastral survey map, while those on the islands, including Hong Kong, are only approximate. Water is in blue, with the depths of surrounding sea from 0 to 5, 5 to 10, 10 to 20, and below 20 fathoms indicated by different shades.

India. **Surveyor-General of India.**

Maps published by the Survey of India during the quarter ending June 30, 1913. General maps: Railway, Canal, and Road map of India (with hills), scale 1 inch to 32 miles, 6 sheets; Railway, Canal, and Road map of India (with hills and rainfall contours), scale 1 inch to 32 miles, 6 sheets; India, showing Railways with Stations, scale 1 inch to 32 miles, 6 sheets; Military Traffic map of India, scale 1 inch to 64 miles. Miscellaneous maps: Scale 1: 2,000,000, Southern Persia sheet; scale 1 inch to 4 miles, Dhar State, Jobat State; scale 1: 1,000,000. India and adjacent countries, sheets 55 (provisional issue), 57, and part of 66 (provisional issue without hills). Degree sheets: Burma, scale 1 inch to 4 miles, sheet 93 G. Standard maps, scale 1 inch to 1 mile: Assam, 78–O 3, 78–O 8, 78–O 10, 78–O 12, 89–D 1; Bengal and Assam, sheet 83–D 2; Bihar and Orissa, sheets (preliminary editions) 72–C 14, 72–L 6, 72–L 10, 72–L 11, 72–L 12, 72–P 1, 72–P 2; Burma, sheets 84–M 9, 94–E 8, 94–I 13; Central Provinces, sheet 55–M 15, 55–M 16, 55–N 13; Kashmir and Jammu, sheets 43–F 11, 43–F 16, 43–J 11, 43–J 12, 43–J 16, 43–N 4; Madras and Mysore, sheets 48–K 13, 48–O 2; North-West Frontier Province, Punjab and Kashmir and Jammu, sheet 43–F 12; Punjab, sheets 43–H 2, 44–E 2, 44–E 4, 44–E 10, 44–E 11, 44–E 12, 44–E 16, 44–I 2, 44–M 8; Punjab and North-West Frontier Province, 43–C 1; United Provinces, sheets 53–L 16, 53–P 8, 54–M 1, 54–M 6, 54–M 9, 54–M 13, 63–A 3, 63–A 5, 63–A 14, 63–A 15, 63–E 2, 63–E 3; United Provinces and Central India, sheets 54–O 5 (2nd preliminary edition), 63–C 1 (preliminary edition). South-Eastern Frontier, scale 1 inch to 4 miles, sheet 2 N.W. (3rd edition). Calcutta: Map Record and Issue Office, 1913. *Presented by the Surveyor-General of India.*

Japan. **Japanese Government.**

General Railway Map of Japan. Scale 1: 1,000,000 or 1 inch to 15·8 stat. miles. Tokyo: Japanese Government, 1912.

New edition of an outline map showing railways opened and under construction, government railways being distinguished from those of private companies. Names in Japanese, with larger towns also in English.

Russia. **Military Topographical Dept., St. Petersburg.**

Map of the Southern Frontier Regions of Asiatic Russia. [In Russian.] Scale 1: 1,680,000 or 1 inch to 26·5 stat. miles. Sheets: VI., Irkutsk; XII. Karkaralinsk-Semipalatinsk-Saissan Nor; XVI. Korea; XIX. Tashkent. (Each sheet 20¼ by 22¾ inches.) St. Petersburg: Military Topographical Department, 1913.

New editions. Relief in brown shading, water blue.

AFRICA.

East Africa Protectorate. **Geographical Section, General Staff.**

Africa. Scale 1: 250,000 or 1 inch to 3·95 stat. miles. Sheets: North A 36–Q (Provisional), Elgon; North A 36–X. Uasin Gishu; South A 37–A. Nakuru-Nyeri. (Each sheet 17½ by 17½ inches.) Surveyed under the direction of the Director of Surveys, East Africa Protectorate, 1912. Geographical Section, General Staff, War Office, 1913. London Agents: E. Stanford, Ltd.; Sifton, Praed & Co.; T. Fisher Unwin. *Price 1s. 6d. each sheet. Presented by the Director of Military Operations.*

Relief shown by brown contours at 200-feet intervals. Water blue, forests green.

Egypt. **Egyptian Survey Dept.**

Topographical Map of Egypt. Scale 1: 10,000 or 6·3 inches to 1 stat. mile. Sheet N.W. 16–4. Mudiria Beheira (18 by 19 inches). Giza: Survey Department, 1913. *Presented by the Director-General, Egyptian Survey Department.*

German South-West Africa. **Sprigade and Lotz.**

Karte des Sperrgebiets in Deutsch-Südwestafrika in 10 Blattern. Im Auftrage der Deutschen Diamanten-Gesellschaft M. B. H. Bearbeitet von P. Sprigade und Dr.

H. Lotz. Scale 1 : 100,000 or 1 inch to 1·6 stat. miles. Berlin : Dietrich Reimer (Ernst Vohsen), [1913]. *Price* 8 M. *each sheet. Presented by the Publishers.*

A large-scale map of the western part of German South-West Africa, north of 26° S. lat. and west of 17° 10′ E. long., prepared on behalf of the Deutsche Diamenten-Gesellschaft of Berlin, specially to show the location of the various diamond fields concessions which, since the discovery of diamonds in the country in 1908, have been taken up by different companies, whose rights are protected by Government. The areas of these concessions of the various companies are shown by different colours, and these are, of course, closed to unauthorised prospectors or outside interference.

The map is well produced in colours with considerable details as to roads and tracks, watercourses, springs, farms, and other information. Relief is indicated by horizontal form lines in brown. The scale of the map appears somewhat unnecessarily large for the purpose, specially as a greater part of some of the sheets is almost a blank; but doubtless this has been arranged so that future details and new concessions can be laid down as they are required. Each sheet measures 22 by 36 inches. There is a note under the title giving full particulars concerning the map, and the sources from which it has been prepared.

Kamerun. **Moisel.**

Karte von Kamerun. Bearbeitet von M. Moisel. Scale 1 : 300,000 or 1 inch to 4·7 stat. miles. Sheets : E 2, Banjo; F 2, Fumban; G 2, Jaunde. Berlin : Dietrich Reimer (Ernst Vohsen), 1913. *Presented by the Publisher.*

Additional sheets of the large map of Kamerun in course of publication. Relief in brown shading, water blue, and boundaries in various colours.

Kamerun. **Moisel.**

Kamerun mit Togo. Bearbeitet von Max Moisel. Scale 1 : 2,000,000 or 1 inch to 31·56 stat. miles. Berlin : Dietrich Reimer (Ernst Vohsen), 1913. *Price, unmounted,* 5*M. Presented by the Publishers.*

A handy-sized single-sheet general map, constructed from the latest surveys and explorations, and giving a large amount of useful information, specially as regards boundaries, railways, steamship lines, and telegraph cables.

Nigeria, Southern. **Guggisberg.**

Africa. Scale 1 : 125,000 or 1 inch to 1·97 stat. miles. Sheets : North B 31–C 11, Igangan West; North B 31–D 1, Igangan; North B 31–J. II. and IV., Ijebu-Odé; North C 31–U 11 (Provisional Series). Shaki-West. Published by the authority of Sir Frederick Lugard, G.C.M.G., C.B., D.S.O., Governor, under the direction of Major F. G. Guggisberg, C.M.G., R.E., Director of Surveys, Southern Nigeria, and Captain R. H. Rowe, R.A., Deputy Director, Topographical Branch. Edinburgh and London : W. & A. K. Johnston, Ltd., 1913. *Price* 1*s.* 6*d. each sheet. Presented by the Publishers.*

New sheets of the Southern Nigeria Government Survey, the first sheets of which were noticed in *Geographical Journal* for June, 1908.

Tunis. **Babelon, Cagnat, and Reinach.**

Atlas Archéologique de la Tunisie. Edition Spéciale des cartes Topographiques publiées par le Ministère de la Guerre, accompagnée d'un Texte Explicatif par MM. E. Babelon, R. Cagnat, S. Reinach. 14e Livraison. Paris : Ernest Leroux, 1912.

Sheets of the Government survey of Tunis, with archæological information added in red, and descriptive text.

AMERICA.

America. **U.S. Dept. of Agriculture.**

Natural Forest Regions of North America and their characteristic tree growth. Scale 1 : 20,000,000 or 1 inch to 315·6 stat. miles. Natural Forest Region of South America. Scale 1 : 20,000,000 or 1 inch to 315·6 stat. miles. Washington : U.S. Department of Agriculture, Forest Service, 1910. *Presented by the U.S. Department of Agriculture.*

Outline maps of North and South America, measuring 17½ × 13½ inches, showing forest regions in different colours, according to their character. With explanatory notes.

Canada. **Bacon & Co.**

Pitner's New Map of Alberta and Saskatchewan. Scale 1 : 1,330,560 or 1 inch to 21 stat. miles. Compiled from the latest official and private surveys by G. W.

Bacon & Co., Ltd. for Carl Pitner & Company, Ltd., Vancouver, B.C., 1913. *Price* 21*s*. *Presented by Messrs. G. W. Bacon & Co., Ltd.*

A somewhat highly coloured general map, measuring 48 by 38 inches, showing, in red, railways working, under construction, and located. A small geological map is given as an inset, and on the top is an index to place-names which will be useful for reference. No attempt has been made to represent relief.

North America. **U.S. Geological Survey.**

Map of North America. Reduced from map on scale of 1 : 5,000,000 compiled by the U.S. Geological Survey. Scale 1 : 10,000,000 or 1 inch to 157·8 stat. miles. Washington: U.S. Geological Survey, 1912. *Presented by the Director of the U.S. Geological Survey.*

An outline map measuring 37 by 38 inches.

United States. **The Diagram Co.**

The Hudson-Mohawk Gap. Prepared for the London School of Economics and Political Science by the Diagram Co., from a map by B. B. Dickinson. Scale 1 : 1,250,000 or 1 inch to 20 stat. miles. London: Sifton, Praed & Co., [1913]. *Price* 6*d*. *Presented by the Publishers.*

An outline map measuring 22 by 18 inches, without names, showing rivers in blue, and contours in feet at the following intervals: 100, 500, 1000, 1500, 2000, 3000, 4000, 5000.

United States. **General Land Office, Washington.**

State of Kansas. Compiled from the Official Records of the General Land Office and other sources under the direction of J. P. Berthrong. Chief of Drafting Division, G.L.O. Scale 1 : 760,320 or 1 inch to 12 stat. miles. Washington: Department of the Interior, General Land Office, 1912.

Outline map without hills, showing railways and boundaries.

United States. **U.S. Dept. of Agriculture.**

National Forests with related projects and data. From base map plates compiled and revised in the General Land Office, Department of the Interior. Reissued with the National Forests and related projects and data by the Office of Geography in the Forest Service. Scale 1 : 2,344,320 or 1 inch to 37 stat. miles. 4 sheets, each measuring 29 × 40½ inches. Washington: U.S. Department of Agriculture, Forest Service, May 1, 1910. *Presented by the U.S. Department of Agriculture.*

Shows forest areas in different colours.

United States. **U.S. Geological Survey.**

Topographic maps issued by the Department of the Interior. U.S. Geological Survey, January, 1912—March 31, 1913. Scale 1 : 12,000 or 5·3 inches to 1 stat. mile. Sheets: Magdalena district, N. Mex.; Miami Copper Belt, Ariz.; Ray and vicinity, Ariz. Scale 1 ; 24,000 or 2·6 inch to 1 stat. miles, sheet: Creed and vicinity, Colo. Scale 1 : 31,680 or 2 inches to 1 stat. mile, sheets: Ashton Bridge, La.; Biggs, Cal.; Buckholts, Tex.; Butte City, Cal.; Chico Landing, Cal.; Clear Creek, Cal.; Courtney, Tex.; Dry Creek, Cal.; Durham, Cal.; Gridley, Cal.; Hollywood, Miss.; Honcut, Cal.; Lake Cormorant, Miss.—Tenn.; Landlow, Cal.; Lula, Miss.; Marysville Buttes, Cal.; Meridian, Cal.; Millikin, La.; Moon Lake, Miss.; Nelson, Cal.; Nord, Cal.; Newhard, Cal.; Palermo, Cal.; Pennington, Cal.; Rockwall, Tex.; Sanborn Slough, Cal.; Tisdale Weir, Cal. Scale 1 : 62,500 or 1 inch to 0·9 stat. mile, sheets: Aurora, Mo.; Bald Knob, W. Va.; Beverly, Wash.; Caldwell, Ohio; Cambridge, Ohio; Canal Dover, Ohio; Canton, Ill.; Carrollton, Ohio; Chelsea, Mont.; Chokio, Minn.; Crossville, Tenn.; Delhi, N.Y.; Gilbert, W. Va.—Va.—Ky.; Hagerstown, Md.-Pa.; Halsey, Oreg.; Hammond, N.Y.; Hartwick, N.Y.; Hay Creek, Mont.; Hilliards, Pa.; Holden, W. Va.; Hot Springs and Vicinity, Ark.; Jefferson County, Ky.; Kezar Falls, Me.—N.H.; Knoxville, Iowa; Kosmosdale, Ky.—Ind.; Lansing, Mich.; Laurelville, Ohio; Livermore, Me.; McCalls Ferry, Pa.—Md.; McKeever, N.Y.; Mason, Mich.; Matewan—Williamson, W. Va.; Milan, Ill.—Iowa; Milledgeville, Ga.; Morris, Minn.; Moses Lake, Wash.; Mullens, W. Va.; Muskingum County, Ohio; Naugatuck, W. Va.; New Athens, Ill.; New Berlin, N.Y.; Nortonville, Ky.; Oak Hill, Ohio; Ontario Beach, N.Y.; Pella, Iowa; Petrified Forest, Ariz.; Pineville, W. Va.; Pocahontas special, W. Va.—Va.; Poplar, Mont.; Point Lockwood, Md.—Va.; Quarryville, Pa.; Randsburg, Cal.; Rochester, N.Y.; Rochester Special, N.Y.; Rolla, Mo.; Salinas, Cal.; Smoke Creek, Mont.;

Welch, W. Va.; Wendell, Minn.; Williamsport, Md.—W. Va.—Pa. Scale 1:125,000 or 1 inch to 1·97 stat. miles, sheets: Blackfoot, Mont.; Buena Vista Lake, Cal.; Castle Rock, Colo.; Coalinga, Cal.; Columbus, Ohio; Cut Bank, Mont.; Flagstaff, Ariz.; Gallatin, Wyo.; McKittrick, Cal.; Mariposa, Cal.; Missoula, Mont.-Idaho; Mogollon, N. Mex.; Mount Goddard, Cal.; Mount Guyot, Tenn.—N.C.; Randolph, Utah—Wyo.; Roosevelt, Ariz.; Thibedean Lake, Cal.; Yellowstone National Park, Wyo.; Zurich, Mont. Scale 1:250,000 or 1 inch to 3·9 stat. miles, sheet: Ivanpah, Cal.—Nev. Washington: U.S. Geological Survey, 1912–13. *Presented by the Director of the U.S. Geological Survey.*

AUSTRALASIA.

Tasmania. **Surveyor-General, Hobart.**

Map of Tasmania. Scale 1:316,800 or 1 inch to 5 stat. miles, 4 sheets. Hobart: Surveyor-General's Office, [1913]. *Presented by the Lands and Survey Department, Tasmania.*

New edition of a coloured general map in 4 sheets, each measuring 31 by 22 inches.

Western Australia. **Dept. of Lands and Surveys, Perth.**

Map of Western Australia. Scale 1:4,752,000 or 1 inch to 75 stat. miles, 1912. Map of Western Australia. Scale 1:3,168,000 or 1 inch to 50 stat. miles, 1911. Map of Western Australia. Scale 1:1,584,000 or 1 inch to 25 stat. miles, 1911. 4 sheets. Map of Western Australia. Scale 1:63,360 or 1 inch to 1 stat. mile. Sheets 20, 23, 33, each measuring 20 by 30 inches. Map of Western Australia showing distribution of stock, statistics 1911. Scale 1:3,168,000 or 1 inch to 50 stat. miles. Map showing statistical areas in the south-west portion of Western Australia: Distribution of Agricultural Statistics, 1911–12. Scale 1:1,000,000 or 1 inch to 15·8 stat. miles. Map of south-west part of Western Australia, showing Agricultural and Pastoral Lands and the products for which they are best suited. Scale 1:2,000,000 or 1 inch to 31·5 stat. miles. Perth: Department of Lands and Survey. *Presented by the Department of Lands and Survey, Perth.*

PACIFIC OCEAN AND ISLANDS.

Hawáii. **U.S. Geological Survey.**

Topographic map of the Island of Kauai, Kauai County, Hawaii. Surveyed by the U.S. Geological Survey in co-operation with the Territory of Hawaii, W. F. Frear, Governor, Marston Campbell, Supt. of Public Works. Scale 1:62,500 or 1 inch to 0·9 stat. mile. Washington, U.S. Geological Survey, 1912. *Presented by the Director of the U.S. Geological Survey.*

A detailed map measuring 29½ by 38 inches, is similar in style to the large-scale topographic sheets of the U.S. Survey. Relief is shown in brown contours 50-feet intervals, water blue.

GENERAL.

World. **Allen and Jones.**

An Atlas of Commercial Geography. Compiled by Fawcett Allen, with an Introduction by D. A. Jones. Cambridge: University Press, 1913. *Price 3s. 6d. net. Presented by the Publishers.*

An atlas (demy quarto size) containing forty-eight maps, five pages of Introductory letterpress, and an index to place-names. The maps have been selected and revised under the supervision of Mr. Allen, and he has done his best with the material placed at his disposal; while Mr. Jones has written short but useful notes to accompany them. The atlas is specially intended to be used with the 'Elementary Commercial Geography' published by the Cambridge University Press, but it is hoped that the series of maps, illustrating the elementary facts of economic geography, will be of general use to students.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, from August 31 to September 27, 1913. *Presented by the Hydrographer, Admiralty.*

New Charts—No. 140, China, Yang tse Kiang: Han kiang, Hankau to An lu fu, 2s. **New Editions**—2263, Atlantic ocean: South Atlantic

ocean, 3*s*. 1491, England, east coast: Harwich harbour, 5*s*. 417, North sea, Denmark: Graa deep (Plan: Esbjerg harbour), 2*s*. 86, Spain, west coast: Cadiz bay and approaches (Plan added: Cadiz harbour), 3*s*. 2548, Spain, west coast: Vigo and Pontevedra bays, 3*s*. 632, Africa, west coast: Walfisch bay to Orange river (Plans: Spencer bay, Hottentot bay, Ichabo, Angra Pequeña (Lüderitz bay), Possession road, Prince of Wales bay), 3*s*. 795, Malacca strait: Cape Rachado to Singapore (Plan added: approaches to Malacca), 4*s*. 3184, China, Yang tse Kiang (Plans in the Yang tse kiang: Itu reach), 2*s*. 3041, Manchuria: America bay. 2*s*. 2405, Japan: The Kuril islands, from Nipon to Kamchatka, 4*s*. 953, Japan, Nipon: Omai saki to Tsurugi saki, including Suruga wan and Sagami wan (Plans added: Mera Koura, Yeno ura), 3*s*. 1079, Tasmania: Tasmania, formerly Van Diemen Land, 3*s*. 179, Pacific ocean, New Hebrides islands: Espiritu Santo island (Plan: Turtle and Pallikulo bays and approaches), 2*s*. 2039, South America, east coast: Index to the rivers Parana and Uruguay, Index to the river Paraguay, 2*s*. 2522, South America, east coast: Santa Catharina island to Rio de la Plata (Plans: Imbituba bay, Anchorages of Castillo and Polonio, Paloma harbour and roads), 4*s*. 256, West Indies, Jamaica: Port Royal to Pedro bluff (Plan added: Carlisle bay), 3*s*. 448, West Indies, Jamaica: Pedro bluff to South Negril point (Plans: Savannah la Mar anchorage, Black river anchorage. Plans added: Blewfields anchorage, Negril bay and harbour), 3*s*. 459, West Indies, Jamaica: Plans of anchorages in Jamaica: Montego bay, Port Maria, Dry harbour, Green island harbour, St. Lucea harbour, Manchioneal harbour, Mosquito cove, Rio Bueno harbour (Plans of Carlisle bay and Blewfields anchorage on this sheet erased. Plans added: Ora Cabeza bay, Hope bay anchorage), 2*s*. 593, Arctic America, Alaska: Yukon river to Point Barrow, including strait (Plans: Anchorage of Chamisso, Port Clarence and Grantley harbour, Entrance to Grantley harbour), 3*s*.

(*J. D. Potter, Agent.*)

Atlantic, North. **U.S. Hydrographic Office.**

Pilot chart of the North Atlantic Ocean, September, 1913. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Atlantic, North, and Mediterranean. **Meteorological Office.**

Monthly Meteorological charts of the North Atlantic and Mediterranean, September, October, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

Burma. **Hunton.**

Rangoon river: North D'Silva Point to Kyauktan or Hmawun Creek. Surveyed April and May, 1913, by A. S. Hunton, F.R.G.S., River Surveyor, under the direction of H. G. G. Ashton, F.R.G.S., Deputy Conservator of the Port. Scale 1: 18,153 or 4 inches to 1 stat. mile. Rangoon: Commissioners for the Port of Rangoon, 1913. *Presented by the Deputy Conservator of the Port, Rangoon.*

Indian Ocean. **Meteorological Office.**

Monthly meteorological charts of the Indian Ocean, September, October, 1913. London: Meteorological Office, 1913. *Price 6d. each. Presented by the Meteorological Office.*

Indian Ocean. **U.S. Hydrographic Office.**

Pilot chart of the Indian Ocean, October and November, 1913. Washington: U.S. Hydrographic Office, 1913. *Presented by the U.S. Hydrographic Office.*

Pacific, North. **U.S. Hydrographic Office.**

Pilot charts of the North Pacific Ocean, October and November, 1913. Washington: U.S. Hydrographic, Office, 1913. *Presented by the U.S. Hydrographic Office.*

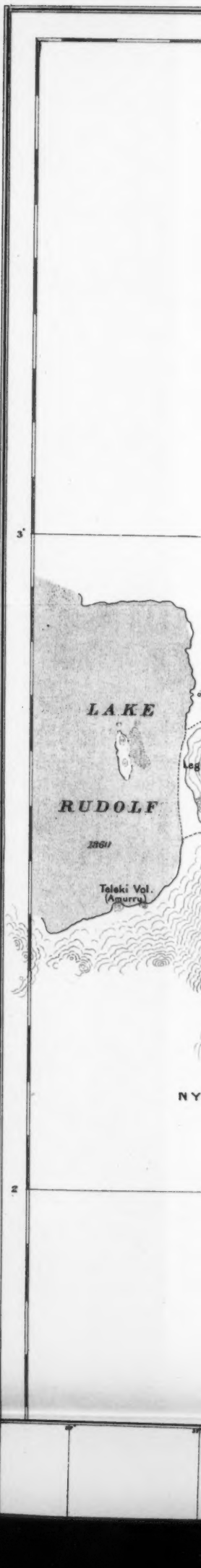
N.B.—It would greatly add to the value of the collection of Photographs which have been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

LIST OF POSITIONS

FROM

Mr. G. F. Archer's Triangulation.

Place.	Latitude N.			Longtitude E.			Heights from theodolite vertical angles	Remarks.
	°	′	″	°	′	″		
Koitogor	0	36	01	37	33	32	4067	Tripod Beacon on H.P. South end of Scarp lying N. N. W. of Neuman's Camp Uaso Nyiro.
J. (Bambom Kop)	0	38	26	37	42	41	3318	Quadripod Beacon H. P. Isolated Kop situated on South bank Uaso Nyiro E.N.E. of and 6 miles distant from "Archer's Post."
Larisero	0	45	19	37	40	49	3162	Tripod Beacon on small Hog-backed hill about 8 miles N,N.W. of J.
Kauro	0	58	29	37	40	53	3440	Tripod Beacon on extreme East edge of N.E. hill—in row of three—situated 6 miles S S.W. of Kauro water-hole.
Langaia	1	12	24	37	45	47	3150	Quadripod Beacon H.P. (about centre of) Langara Hill.
Merille East ..	1	23	22	37	48	45	2260	Quadripod Beacon on H.P. Small Cone—most North Easterly of three—situated about 2½ miles South of Merille water-holes.
Merille West ..	1	21	14	37	41	10	2860	Quadripod Beacon on H.P. Isolated Hill some 9 miles W.S.W. ot Merille East Not to be confused with hill, also beaconed, about 4 miles West.
Uaragess	0	57	04	37	23	47	8847	H.P. East side. Not Peak West side fixed by Survey Department.
Y Mathews Range	1	18	29	37	17	53	—	Fairly conspicuous point about middle of Range.
Moille	1	31	19	37	44	09	3198	Sharp peak (probably unscaleable) of conspicuous isolated hill some 6 miles S.W. of Lasamis.
Lodermurt ..	1	42	37	37	42	53	4712	H.P. West side. This hill is a very conspicuous landmark.
Sengerarua ..	1	42	26	37	51	54	2372	Quadripod Beacon on Northern of 3 isolated Cones.
(M) Lolojonga	2	7	34	37	45	23	3512	Quadripod Beacon on H.P.
(M) Kamboi	2	6	29	37	53	25	3096	Quadripod Beacon on Northern of two hills N.W. of Ret Water.
(M) Signalling Hill ..	2	15	50	37	54	01	4733	Quadripod Beacon on high hill (some 600 ft.) on S.W. edge of Marsabit Forest, by side of old caravan road.
(M) Onetree Hill ..	2	18	47	37	57	02	5560	Solitary tree on high Cone situated on N.W. side of Marsabit Forest. Conspicuous point.
(M) Kakuma	2	19	17	37	47	21	3341	H.P. Sharp Cone.
(M) Horodera	2	32	00	38	4	32	3630	H.P. conspicuous Cone at Northern foot of Mt. Marsabit.

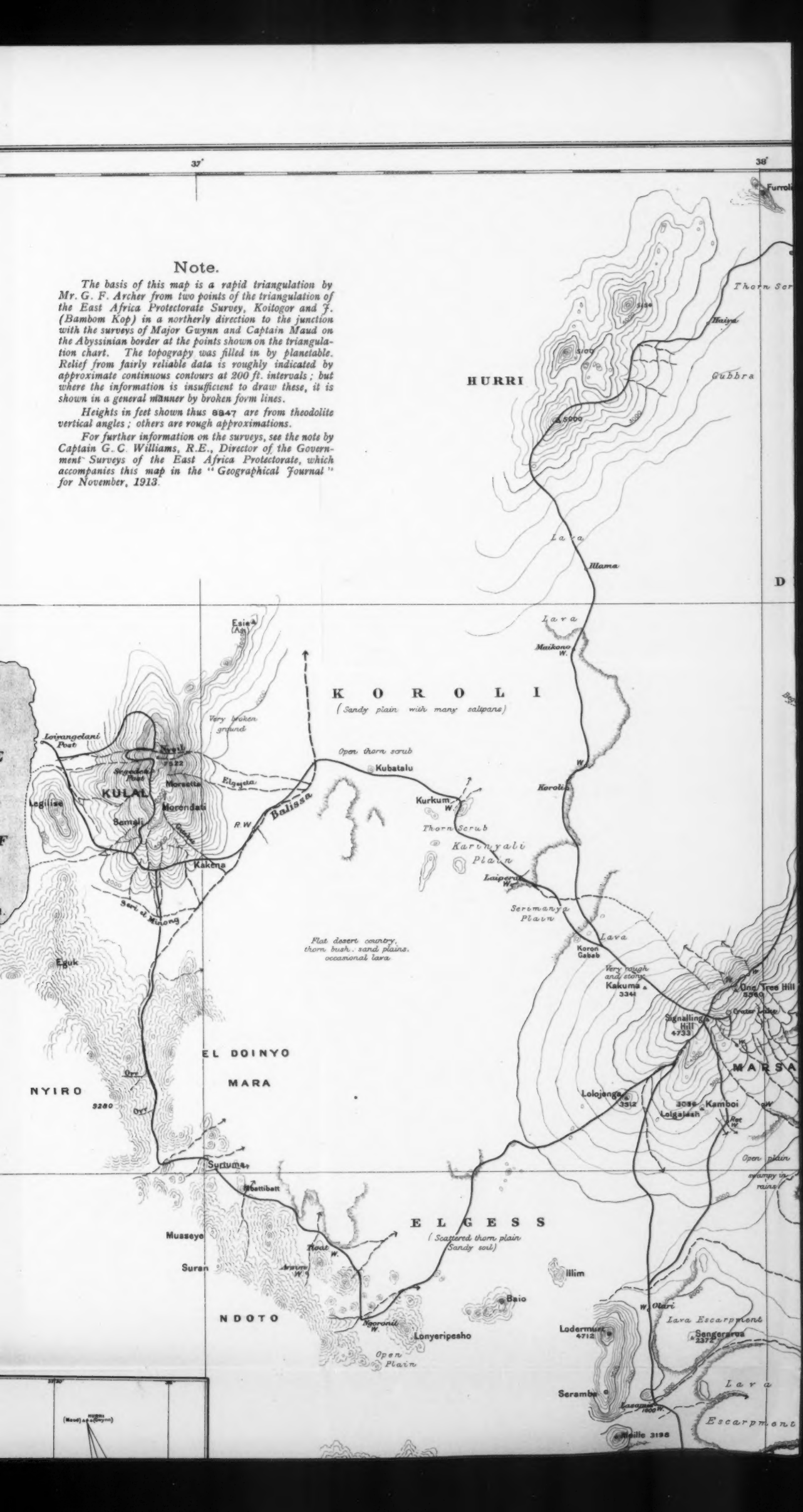


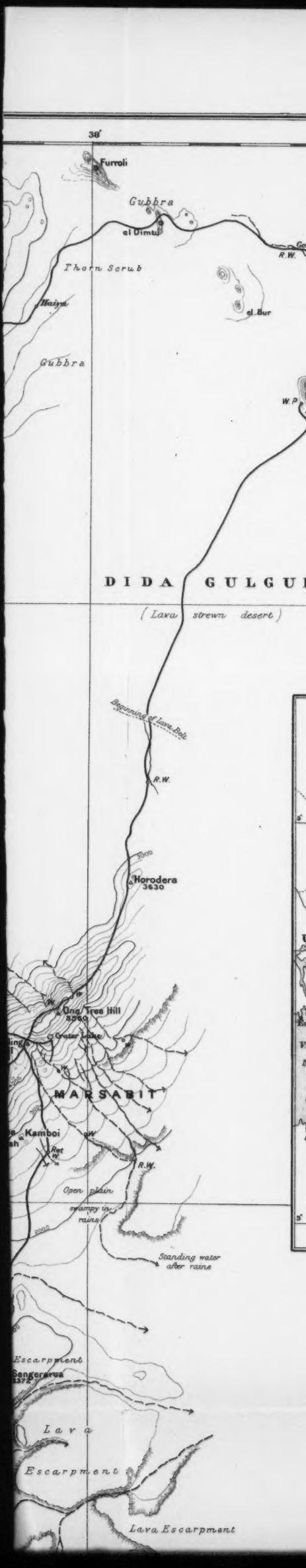
Note.

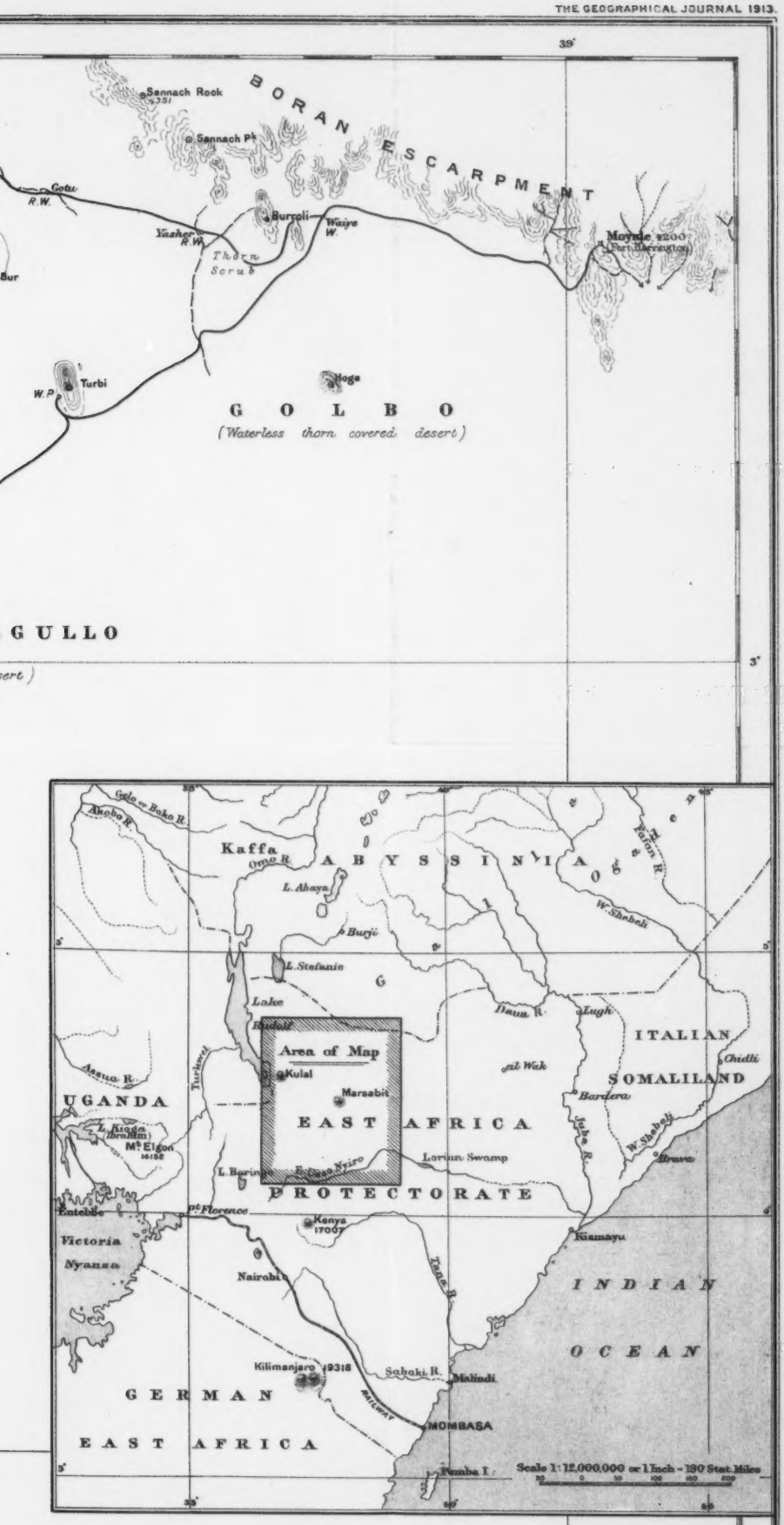
The basis of this map is a rapid triangulation by Mr. G. F. Archer from two points of the triangulation of the East Africa Protectorate Survey, Koitogor and J. (Bambom Kop) in a northerly direction to the junction with the surveys of Major Gwynn and Captain Maud on the Abyssinian border at the points shown on the triangulation chart. The topography was filled in by planetable. Relief from fairly reliable data is roughly indicated by approximate continuous contours at 200 ft. intervals; but where the information is insufficient to draw these, it is shown in a general manner by broken form lines.

Heights in feet shown thus 8847 *are from theodolite vertical angles; others are rough approximations.*

For further information on the surveys, see the note by Captain G. C. Williams, R.E., Director of the Government Surveys of the East Africa Protectorate, which accompanies this map in the "Geographical Journal" for November, 1913.




38°
Furroli
Gubbra
el Dimtu
R.W.
Thorn Scrub
Haiya
el Bur
Gubbra
W.P.
DIDA GULGU
(Lava strewn desert)
Beginning of Lava Rock
R.W.
Thorn
Horodera
3630
Ong Tree Hill
5960
Crater Lake
MARSABIT
Kamboi
Rat
R.W.
Open plain
swampy in rains
Standing water after rains
Escarpment
Sengeraroa
Lava
Escarpment
Lava Escarpment

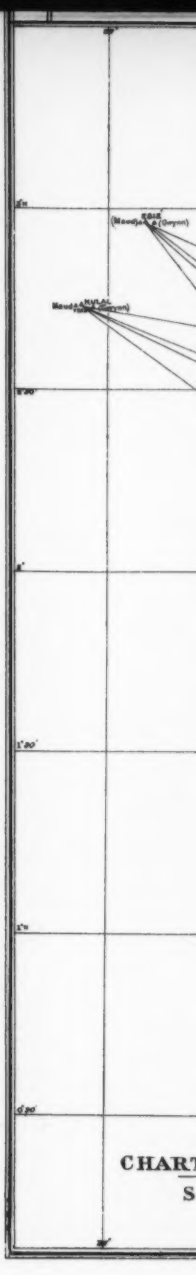


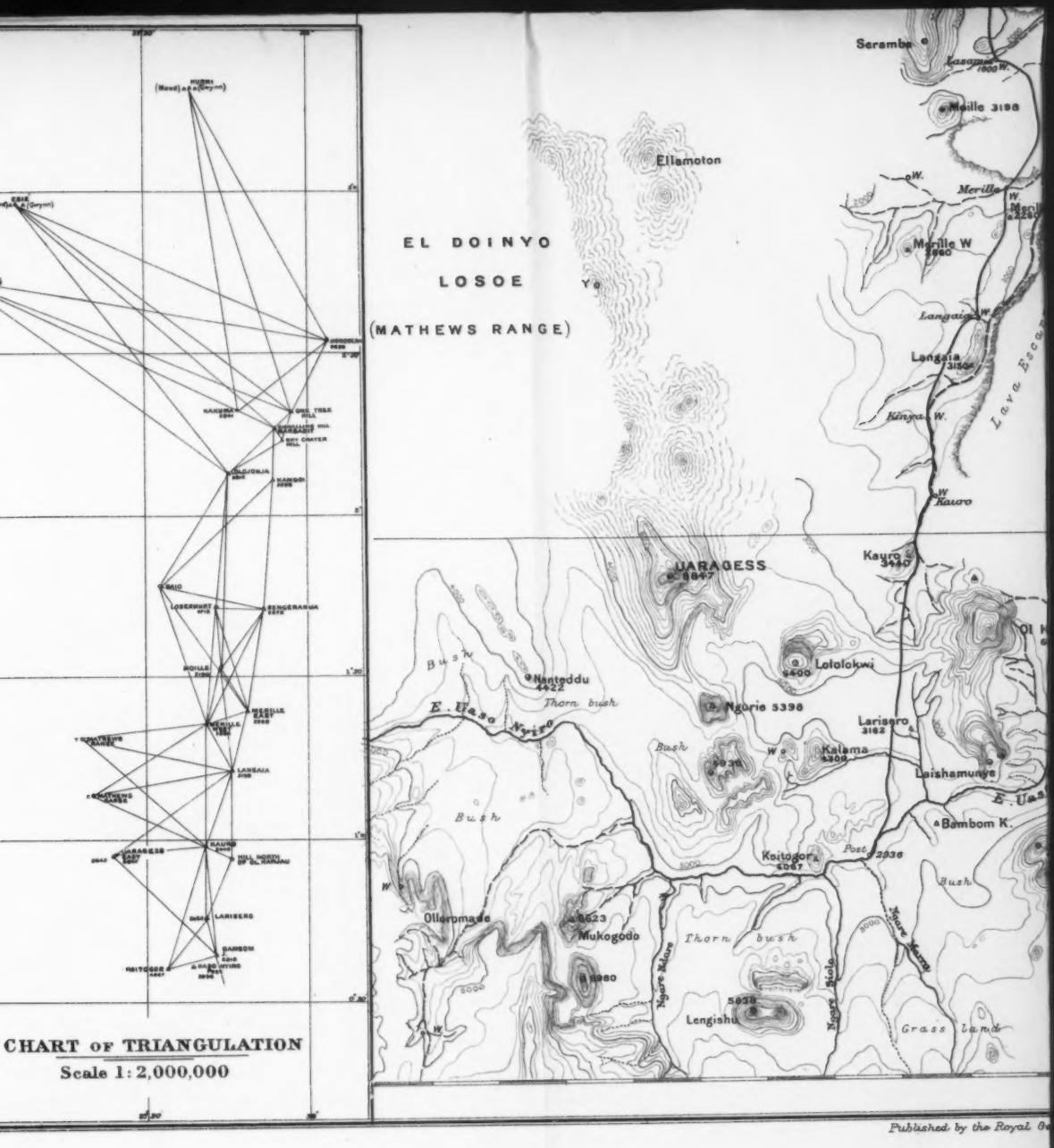
EAST AFRICA PROTECTORATE

EXPLORATIONS AND SURVEYS

										Cone situated on N. E. side of Marsabit Forest. Conspicuous point.
(M) Kakuma ..	..	2	19	17	..	37	47	21	..	3341	H.P. Sharp Cone.
(M) Horodera ..	..	2	32	00	..	38	4	32	..	3630	H.P. conspicuous Cone at Northern foot of Mt. Marsabit.
Kulal ..	..	2	43	53	..	36	55	38	..	7522	H.P. at Southern extremity of the Northern section of the Mountain. (Clearing in forest and under Solitary Date Palm Tree.)
Esie or Asi ..		2	57	54	..	37	6	05	..	—	H.P. prominent Cone.
Hurri—South Cone		3	19	12	..	37	38	34	..	—	H.P. prominent Cone, high up Southern Slopes of the Range.

NOTE. M.—Marsabit.
H.P.—Highest Point.





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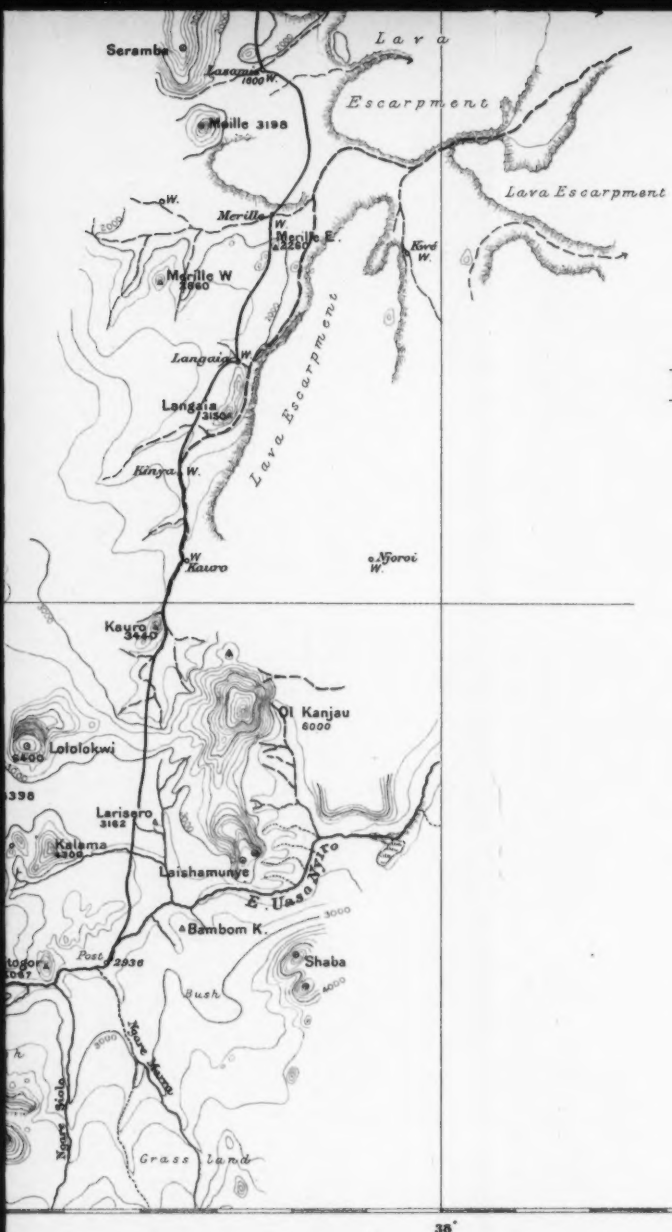

NORT

38°

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EAST AFRICA PROTECTORATE

EXPLORATIONS AND SURVEYS

in the

ORTHERN FRONTIER DISTRICT

by

G. F. ARCHER.

1909-12.

Scale 1:800,000 or 1 Inch = 12·63 Statute Miles.

10 0 10 20 30 40 Stat. Miles

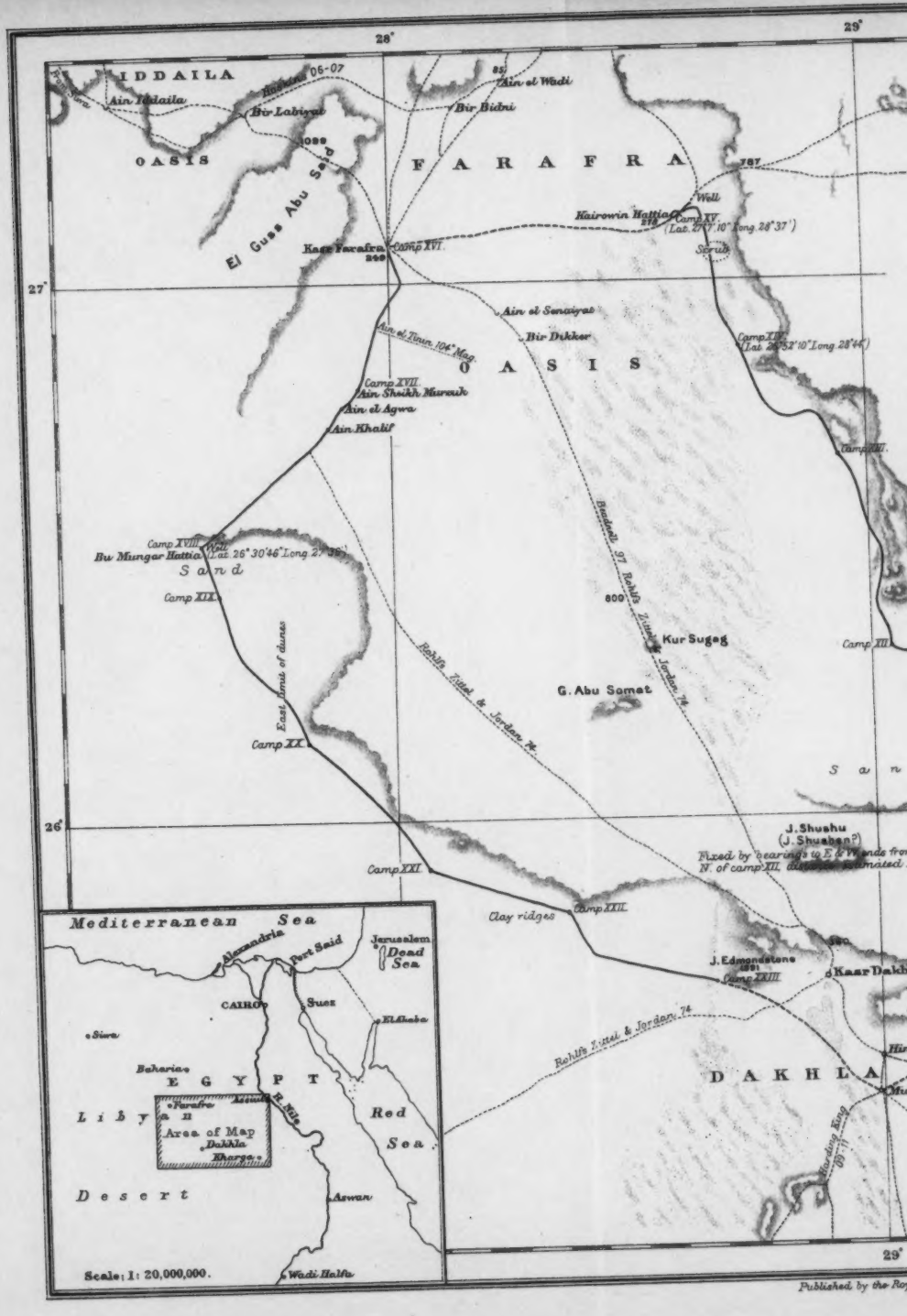
Reference.

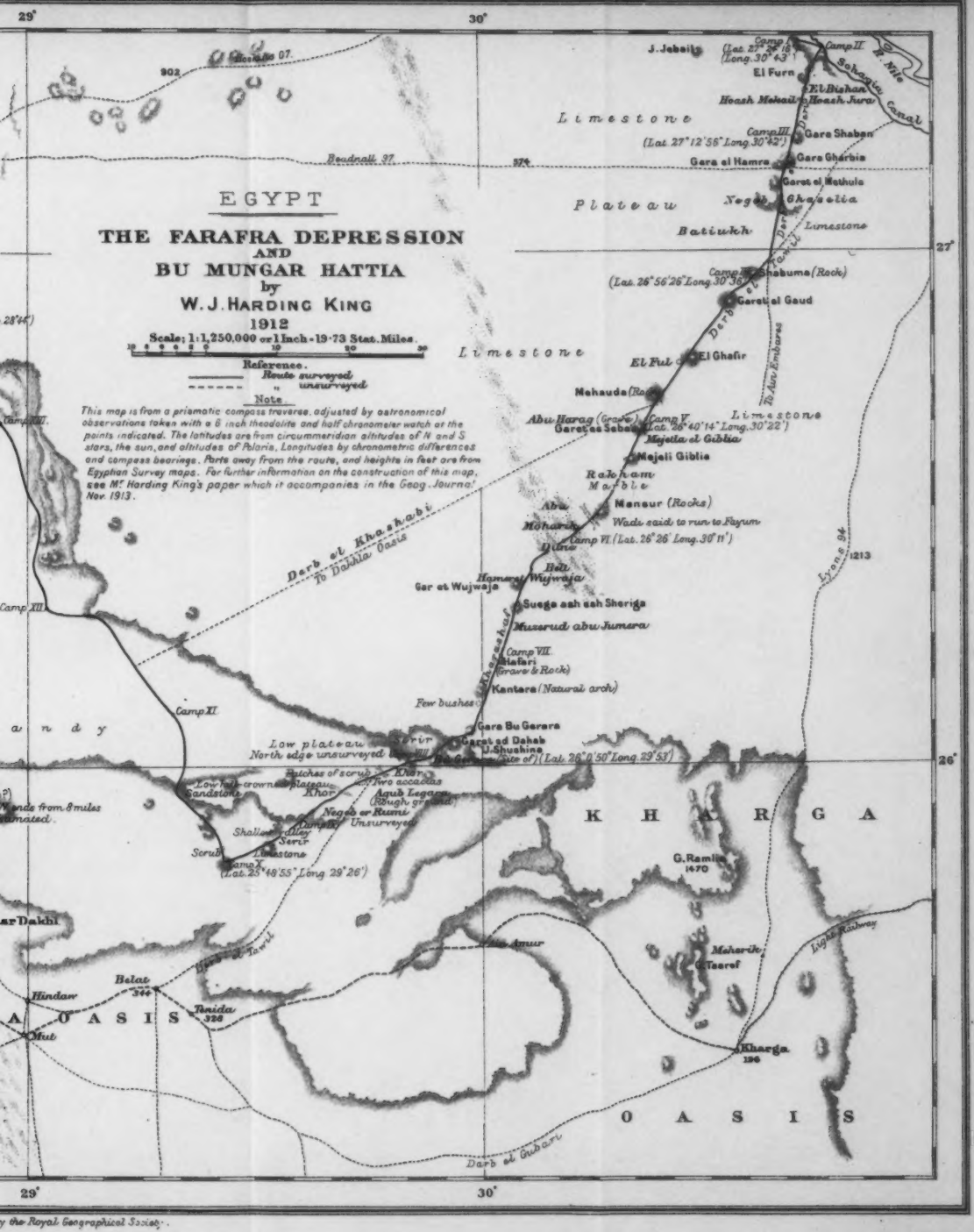
Route .....
Trigonometrical Points ..... △
Intersected " ..... ⊙
Dry Watercourses .....
Rainwater, not permanent ..... R.W.
Wells, perennial water ..... W.

1°

39°

EAST AFRICA PROTECTORATE
ARCHER.


28°
29°
27°
26°
IDDAILA
OASIS
Ain Iddaila
Bir Labiyat
Ain el Wadi
Bir Bidni
F A R A F R A
787
Well
Kairowin Hattia
Camp XV.
(Lat. 27°7'10" Long. 28°37')
Kasr Farafra
Camp XVI.
El Guss Abu Said
Scrub
Ain el Senaiyat
Bir Dikker
Ain. el Tinin. 104° Mag.
O A S I S
Camp XIV.
(Lat. 26°52'10" Long. 28°44')
Camp XVII.
Ain. Sheikh Murzuk
Ain el Agwa
Ain Khalif
Camp XIII.
Camp XVIII.
Well
Bu Munger Hattia
(Lat. 26°30'46" Long. 27°38')
S a n d
Camp XIX.
Boundary 97 Rehlis
800
Kur Sugeg
Camp III.
East limit of dunes
Rehlis Tittel & Jordan 74
G. Abu Samat
Camp XX.
S a n
J. Shushu
(J. Shushan?)
Fixed by bearings to E. & W. ends from
N. of camp XIII. distance estimated
Camp XXI.
Clay ridges
Camp XXII.
J. Edmondstone
1891
Camp XXIII.
Kasr Dakh
Rehlis Tittel & Jordan 74
D A K H L A
Mediterranean Sea
Alexandria
Port Said
Jerusalem
Dead Sea
CAIRO
Suez
El Akaba
Siwa
Baharia
E G Y P T
Libyan
Farafra
Dakhla
Kharga
Area of Map
R. Nile
Red Sea
Desert
Aswan
Wadi Halfa
Scale: 1: 20,000,000.
Published by the Ro



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EGYPT
HARDING KING